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Dr. *SHORT*'s

HISTORY

OF

Mineral Waters, &c.

Sept. 17, 1733.

At a Meeting of the Council of the ROYAL SOCIETY,

Ordered,

THAT Dr. *Thomas Short* be deſired to Print his *Natural Hiſtory of the Mineral Waters of* Scarborough, *&c.*

HANS SLOANE, *Præſes R. S.*

J Goodley

82939

THE

NATURAL, EXPERIMENTAL, and MEDICINAL

HISTORY

OF THE

MINERAL WATERS

OF

Derbyſhire, *Lincolnſhire*, and *Yorkſhire*,

Particularly thoſe of

SCARBOROUGH.

WHEREIN,

They are carefully examined and compared, their Contents diſcovered and divided, their Uſes ſhewn and explained, and an Account given of their Diſcovery and Alterations.

Together with the

NATURAL HISTORY of the EARTHS, MINERALS and FOSSILS through which the Chief of them paſs.

THE

Groundleſs Theories, and Falſe Opinions of former WRITERS are expoſed, and their Reaſonings demonſtrated to be injudicious and inconcluſive.

To which are added,

Large MARGINAL NOTES, containing a Methodical Abſtract of all the Treatiſes hitherto publiſhed on theſe WATERS, with many OBSERVATIONS and EXPERIMENTS.

AS ALSO

Four Copper-Plates repreſenting the Cryſtals of the Salts of Thirty-four of thoſe Waters.

By *THOMAS SHORT*, M. D. of *Sheffield.*

Aqua Fontana limpida ad Sanitatem conſervandam ſaluberrima, ad amiſſam recuperandam Mineralis præſtantiſſima.

LONDON,

Printed for the AUTHOR, and ſold by F. GYLES over againſt *Gray's-Inn* in *Holborn*, M DCC XXXIV.

TO

SIR *HANS SLOANE*, Bar^{t}.
PRESIDENT,

And to the

COUNCIL and FELLOWS

OF THE

ROYAL SOCIETY

OF

LONDON

FOR IMPROVING

NATURAL KNOWLEDGE.

GENTLEMEN,

YOUR great Name and diſtinguiſh'd Character in the World, your Abilities ſo univerſally acknowledg'd for being the moſt competent Judges of all the various Phænomena *of* Nature, *and of the whole Extent of* Natural *and*

Experimental Philoſophy, *have obliged me to make this my humble Appeal to you, and to crave your Patronage and Protection of the following Sheets, without which I ſhould ſcarce have preſumed to expoſe them to publick View.*

As you are ready to favour all laudable Attempts for the Improvement of uſeful Knowledge, I ſhall be highly pleaſed, if this Eſſay towards giving a true Hiſtory and adequate Analyſis of the Mineral Waters, which conſtitute the ſubject Matter of the following Treatiſe, obtain your Approbation and Countenance; for while you, Gentlemen, *approve and give a Sanction to it, I ſhall not in the leaſt regard the groundleſs Cavils of ſupercilious and pretending Criticks. As I have contradicted the generally received Opinion of the* Non-exiſtence *of fixed Vitriol in Mineral Waters, and given undeniable Evidence of its being often to be found there, ſo I have (ſince theſe Sheets were put to the Preſs,) procured from other Mineral Waters ſome Sort of Nitre, which are undeſcribed by both Ancients and Moderns, and have not ſo much as Names given them;* Specimens *whereof ſhall quickly come under your Examination, that you may not take my* ipſe dixit, *nor your Authority be abuſed.*

I muſt beg Leave to obſerve to you, Gentlemen, *that tho' ſeveral of the Experiments may poſſibly ſeem in themſelves trifling, yet when they are compared with the Inferences which naturally ariſe from them, will, I believe, be found conducive to the greater Perfection of the Work: In this View, I humbly conceive that few of them, if any, could*

could be conveniently omitted. The Repetitions, I hope, will be readily excuſed; as I conſidered, that placing the ſame Facts in various Lights, and ſuggeſting them to the Reader's Mind in different Proſpects, was not only a ſeaſonable Condeſcenſion to ordinary Capacities and unexerciſed *Underſtandings, but might contribute to a greater Perſpicuity in general. I am ſenſible that there are many Defects in this Work, but if I have had the Happineſs to diſcover the genuine Principles which impregnate the Waters treated of in this Eſſay, and have aſſigned their proper Uſes and Effects, it ſufficiently anſwers the Intention of the Author and will abundantly compenſate his Labours. Probably, as Time permits, I may further purſue the Examination of thoſe and ſeveral other Waters.*

I muſt beg Leave, before I finiſh this Addreſs, to embrace an Occaſion ſo happily put into my Hands of teſtifying my moſt grateful and humble Acknowledgements for the favourable Encouragement I have met with in the Proſecution of this Work from ſeveral Perſons who are an Ornament to the Republick *of Letters, as well as to your* Illuſtrious Body. *In this View it is more immediately incumbent upon me to acknowledge the great Honour and Advantage received from the* Humanity *of the* Honourable Gentleman *your* Preſident, *who has not only furniſhed me with ſeveral neceſſary Materials, but was always ready to remove Difficulties, and to excite me to an Enquiry of this Importance, whereby I have attempted to baniſh all precarious, ungrounded, and* meerly notional

Hypotheſes *relating to this Subject, and to treat it upon much clearer Principles, and with a Certainty and* Concluſiveneſs of Induction *unknown to thoſe who have preceded me in this Enquiry, and which, by a diligent and judicious Proſecution, may yet be rendered much more extenſive.*

I am,

Gentlemen,

with all due Reſpect,

Your moſt Devoted,

and Humble Servant,

Sheffield, September 5, 1733.

THOMAS SHORT.

A

LIST

OF THE

Subſcribers NAMES.

N. B. Thoſe marked with a * have ſubſcribed for large Paper.

A.

* HIS *Grace the Duke of* Ancaſter.
* *His Grace* John *Duke of* Argyle *and* Greenwich.
The Rev. Mr. John Abſon, Nottingham.
* Tho. Alderſey, *M. D.* Cheſter.
* John Alford, *Eſq*;
* Allan, *Eſq*;
* *The Rev. Mr.* John Allan *of* Kirkmichael.
Mr. Altree, *Apoth.* Wolverhampton.
Sam. Angier, *M. D.* Liverpool.
Dr. Antrobus *of* Birmingham.
* Archer, *Eſq*;
* Dan. Armſtrong, *Eſq*;
* *The Rev. Wm.* Aſlabie, *M. A. Rector of* Berkin.
* *Mr.* Robert Aſlabie *at* Rotherham.
Dr. Attwood *at* Worceſter.

B.

* THE *Right Honourable the Earl of* Burlington.
* *Sir* George Barlow, *Bart.*
* *Sir* Roger Beckworth, *Bart.*
* *Sir* John Bland, *Bart.*
* *Sir* Humphrey Briggs, *Bart.*
Sir John Bridgeman *of* Caſtle-Bramwich. *Bart.*
Charles Baldwyne *of* Aqualate, *Eſq*;
* George Bamforth *of* High-houſe, *Eſq*; 6 *Books.*
* John Banbury, *Eſq*;
* *The Rev.* John Balgay, *M. A.* Northallerton.
Richard Banner *of* Perry-hall, *Eſq*;
* *Mr.* Ben. Bartlett, *Apoth.* Bradforth.
* Robert Bateman, *M. D.* Ipſwich.

* *Mr.* Tho. Batterſon.
Sam. Barker, *Eſq*;
Charles Bathurſt *of* Clints, *Eſq*;
Ed. Barkham, *Eſq*;
* Hugh Bethel, *Eſq*;
* *Mr.* John Bell, Sheffield, 2 *Books.*
Tho. Bennet, *Eſq*; Nottingham.
The Rev. Mr. Tho. Beaumont.
* *Honourable* Albemarl Bertie, *Eſq*;
* George Beaumont, *Eſq*;
* *Mr.* Ed. Bellamy, *Surgeon* Rotheram.
Dr. Beard, Worceſter.
Matthew Baucherett, *Eſq*;
Mr. Tho. Beetenſon, *Apoth.* Worceſter.
Robert Biddulph *of* Ladbury, *Eſq*;
Mr. John Bingley, Retford.
* Tho. Bootle, *Eſq*;
* Levet Blackborne *of* Lincolns-Inn, *Eſq*;
* John Boucher, *Eſq*;
Mr. James Boreham, *Surgeon*, York.
Mr. James Borwick, *Clerk*, Malton.
Iſaac Barrow *of* Caſtlefield, *Eſq*;
* Henry Bourne, *M. D.* Cheſterfield.
Mr. John Bourne, *Surgeon*, Aſhover.
* *Mr.* Ed. Bourne, *Apoth.* Rotheram.
Dr. Boulton.
Mr. Tho. Bower, *Surgeon*, Repton Derbyſhire.
Rev. Mr. Robert Burms, Darrington.
* John Bright *of* Badſworth, *Eſq*;
* Tho. Bright *of* Badſworth, *Eſq*;
* *Mr.* Alex. Brodie, *Lord* Lyon, *K. at Arms*, Edenburgh.
Orlando Bridgeman *of* Blodwell, *Eſq*;
Mr. Bradſhaw, *Apoth.* Wolverhampton.
Mr. Martin Bryſon *Bookſeller in* Newcaſtle *upon* Tyne, 7 *Books.*
* Robert Buck, *Eſq*;
* Wm. Bunbury, *Eſq*;
* Sam. Buck *of* Rotherham, *Gent.*
Mr. Joſeph Buckle *of* York.
Mr. James Brecknock, *Apoth.*
Bradſhaw *of* Mayall, *Eſq*;

C.

THE Right Honourable H. Ld. Colerane.
* *The Right Honourable Earl of* Cheſterfield, 2 *Books.*
* *The Right Honourable Earl of* Carlile.
* *The Right Honourable* George *Earl of* Cholmondeley.
* *The Right Honourable* John *Earl of* Carmichael.
* *The Right Honourable Earl of* Cornwath.
* Robert Cay, *Eſq*;
* Cater, *Eſq*;
* *Mr.* Alexander Hume, Campbel.
* John Carruthers, *M. D.* Ganeſburgh.
Dr. Cameron, *Phyſician*, Worceſter.
Mr. John Cardale, *Apoth.* Dudley.
* *St.* John Charleton, *Eſq*;
Wm. Chambers, *M. D.* Hull.
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Tho. Clark, *M. A.*
Mr. Ralph Clark, *Apoth.* Grantham.
* A. Churchill, *Eſq*;
James Clegg, *M. D.* Chappel le Fryth.
* *Mr.* Clutterbuck, *Apoth.* Ganeſbugh.
* Leo. Childers, *Eſq*;
Dixſon Colby, *M. D.* Stampford.
Mr. Wm. Cogon, *Alderman of* Hull.
James Cocks, *Eſq*; Worceſterſhire.
* *Mr.* Culmer Cockeril, *Surgeon*, Scarburgh.
* Ed. Commyers, *Eſq*;
* Wm. Connolley, *Eſq*;
* *The Rev. Mr.* Henry Cooke *Rector of* Stockſley.
Richard Connyers, *M. D.*
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* *Dr.* Cookſon, *Phyſician*, Wakefield.
* *Dr.* Tho. Cox, Nottingham.
Mr. John Cotes, Harrigate.
Chriſtopher Cowley, *Gent.* Sheffield.
Robert Cotton, *Eſq*; Worceſter.
Richard Crowle, *Eſq*;
* Haworth Curner, *Eſq*;
* Savile Cuſt, *Eſq*;

D.

* *HIS Grace* William *Duke of* Devonſhire, 6 *Books.*
* *The Right Honourable Earl of* Derby.
* *The Right Honourable* James *Lord* Darcy, 6 *Books.*

* *Sir* Dalrymple *of* Carſland, *one of the principal Clarks of the Seſſion of* Edenburgh.
* Hugh Dalrymple, *LL. D.*
* *Mr.* Stephen Daney, *Apoth.* Kirton.
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Mr. John Dawſon *of* Bawtry.
The Rev. Mr. Dolman *Rector of* Aldridge.
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The Rev. John Drake, Pontefract, *B. D.*
The Rev. John Drake, *M. A. of* Wentworth.
* *The Rev.* Wm. Drake, *B. A. of* Hatfield.
* Franc. Drake, *of* York, *Gent.*
* *Mr.* John Dixſon, *Surgeon,* Ganeſburgh.
* John Dikſon *of* Leeds, *Gent.*
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E.

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* *Dr.* Charles Eyres *of* Doncaſter.
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* *Rev.* William Entwiſle, *M. A.* Badſworth.

F.

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* *Honourable* Bryan Fairfax, *Eſq;*
L. Fairfax, *Apoth* Malton.
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* Richardſon Ferrand, *Eſq;*
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* William Ferrers *of* Baſhall, *Eſq;*
Mr. Peter Finch, *Clerk.*
* Franc. Foljambe *of* Aldwarke, *Eſq;*
* Tho. Fothergill, *Eſq;*
* Fox, *Eſq;*
Mr. Wm. Farrel, *Jun.*
James Faulkner, *Eſq;*

G.

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* James Garth *of* Bradforth, *Gent.*
* John Gell *of* Hopton, *Eſq;*
Tho. Gell *of* Wirkſworth, *Surgeon.*
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* Tho. Giſbourne *of* Derby, *Eſq;*
* *The Rev. Mr.* Goodall.
* *The Rev.* Richard Goodwin, *D. D. of* Preſtwick *and* Tankerley.
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* John Grimſton *of* Burlington, *Eſq;*
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* *The Rev. Mr.* John Griffit *of* Eccington.
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Dr. Tho. Griffith *of* Kilken.

H.

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* *The Right Honourable* Harrietta *Counteſs of* Hopton.
* *Sir* James Hall, *Bart. of* Dunglaſs.
* William Hall, *Eſq; one of the principal Clarks of the Seſſion at* Edenburgh.

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* John Hammond, *Eſq;*
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Caleb Harding *of* Derby, *M. D.* 1 *large*, 20 *ſmall*.
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Mr. Tho. Heaton, Sheffield.
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* George Heneage, *Eſq;*
Brooke Hector, *M. D.* Lichfield.
Mr. Joſ. Higgs, *Surgeon*, Brimingham.
* *Mr.* Nathan Hirſhman, *Surgeon*, Ganeſburgh.
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* *Mr.* John Holland, *Surgeon*, Cheſterfield.
Mr. Henry Hollier, *Apoth.* Brimingham.
* *Mr.* John Hooton, *Apoth.* Lincoln.
Sam. Horſeman, *M. D.*
* *The Rev.* Dan. Hopkins. *M. A. Rector of* Kellington.
* *The Honourable Col.* Charles Howard.
* Edward Horwman, *M. D.*
* Tho. Hutton, *Eſq;*
The Rev. Mr. Humpton, Sheffield.
* *Mr.* John Huſſey, *Apoth.* Sheffield.
Henry Huddleſton, *M. D.* Durham.
Chriſtopher Hunter, *M. D.* Durham.

I.

* THE *Honourable* Sir James Juſtice *of* Creighton, *Bart.*
* William Jeſſop *of* Broomhall, *Eſq;*
The Rev. Mr. Jackſon, *Fellow of* Trinity *College*, Cambridge.
* Sam. Ibbertſon *of* Denton, *Eſq;*
Mr. Adam Ibbotſon *of* Nottingham.
* John Jenkinſon, *Eſq;*
Mr. Wm. James, *Apoth.* Wolverhampton.
* John Johnſon, *M. D.* York.
* Robert Johnſton *of* Wamphrey, *Eſq;*
* *Mr.* James Juſtice *one of the principal Clerks of the Seſſion at* Edenburgh.

K.

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* *The Honourable Sir* John Kaye, *Bart.*
* Sam. Key, *M. D.* London.
Dr. Kimberley, Northampton.
* *The Rev. Dr.* Wm. Knowler.

L.

* THE *Right Honourable Earl of* Lichfield
* *The Right Honourable Lord* Leviſham.
* *The Honourable Sir* Wilfred Lawſon, *Bart.*
* *The Honourable Sir* Wm. Lowther, *Bart.*
* *The Honourable Sir* Henry Lyddel, *Bart.*
* *The Honourable Col.* Anthony Lowther.
* John Lowther, *M. D.* Newcaſtle Tyne.
* Wm. Lawſon, *Eſq;*
Mr. Wm. Langton.
Edward Latham, *M. D.*
Dr. Tho. Lancaſter *of* Sudbury.
* Edward Lee, *M. D.*
* *The Rev. Dr.* George Leigh *of* Hallyfax.
Mr. Alton Levet, *Surgeon.*
* Joſeph Leth, *Clerk*, *Mr. of* Adwick-Street.
Colonel Lignonier.
* Tho. Liſter, *Eſq;*
* Edw. Louiſa Mann, *Eſq;*
* *Mr.* John Ludge, Bernard-Caſtle.
Mr. Lord, *Bookſeller in* Wakefield.
Mr. Wm. Lyon, *Surgeon*, *Sheffield*.
Richard Lyſſet, *Gent.* Wirkſworth.

Mr. Saudamore Lagenby *of the Cuſtom-Houſe in* London.
Mr. John Lockman *of* Covent-Garden.

M.

* HIS *Grace* John *Duke of* Mancheſter.
* *Her Grace* Sarah *Ducheſs Dowager of* Marlborough.
* *The Right Honourable* Alexander *Earl of* Marchmount, 2 *Books.*
* *The Right Honourable* Thomas *Lord* Malton, 6 *Books*
Lord Monſon.
* *The Honourable Col.* John Mordant.
Mr. John Marden, Pontefract.
* Tho. Markham, *Eſq;*
* *Mr.* John Mand, *Merchant.*
* *Dr.* Manwaring, Mancheſter, 2 *Books.*
* *M.* John Mann, *Clerk,* Badſworth.
The Rev. Mr. Margetroid *of* Leeds.
The Rev. Mr. Maſter, *Vicar of* Alton, Warwickſhire.
* Alexander Mc Kenzie *of* Delvin, *Eſq; one of the principal Clerks of the Seſſion,* Edenburgh.
* Robert Mitford, *Eſq;*
Mr. Cuthber Mitford, *Surgeon* Northallerton.
Mr. Maynwaring, *Apoth.* Market Drayton.
* *Mr.* John Murray *one of the principal Clerks of the Seſſion,* Edenburgh.
* *The Rev. Mr.* Anthony Moyr.
* Myres *of Sheffield, Eſq;*
* Richard Mead, *M. D.*
* Cromwell Mortimer, *M. D. Secret. to the Royal Society.*

N.

* HIS *Grace* Edward *Duke of* Norfolk.
* Richard Nelthrop, *Eſq;*
* Edward Nelthrop, *M. D.*
* Tho. Nettleton, *M. D.* Halifax.
M. William Nichols, *Apoth.* Market-Drayton.
Mr. Edward Nichols, *Apoth. in* Stone Staffordſhire.

O.

* JOſeph Offley *of* Norton, *Eſq;* 4 *Books.*
William Offley, *M. D.* Norwich.
* *The Rev. Mr.* William Oates.
* William Oſbaldeſton, *Eſq;*
Othwait, *Eſq;*
Mr. Owen, *Apoth.* Warrington.
Mr. William Oldyſe.

P.

* RIght *Honourable Lord Viſcount* Primroſe.
* *The Honourable Sir* Tho. Parkin, *Bart.*
* *The Honourable Sir* William Purvis *of* Purvis.
Dr. Robert Pakey.
Col. Pagit.
Mr. Henry Paramour, Stapples-Inn, London.
* William Parkin *of* Mortinley, *Gent.*
Sam. Parkins, *M. D.*
Mr. Franc. Parkins, *Surgeon,* Nottingham.
* *Mr.* Wm. Paſhley *of* Wentworth.
* Tho. Parkins *of* Wymſwould, *Eſq; Com.* Nottingham.
* Henry Pierce *of* Bedal, *Eſq;*
* German Pole, *Eſq;*
* Pepper, *Eſq;*
The Rev. Dr. Powel, *Dean of St.* Aſaph, 1 *large* 2 *ſmall.*
Mr. Potter, *Bookſeller in* Cheſter, 7. *Books.*
William Plowden, *Eſq;* Worceſterſhire.
* *Dr.* Andrew Plummer.
* *Dr.* Franc. Pringle.
* Tho. Pullen, *Eſq;*
Dr. Purcel. Worceſter.
Edward Preſton *of* Malton, *Gent.*
William Pye, *L. B.*
* Joſeph Pycockland, *Surveyor,* Rotheram.

Q.

* THE *Honourable Sir* Wm. St. Quinton.
* Matthew St. Quinton, *Eſq*;

R.

* HIS *Grace* John *Duke of* Rutland.
* *The Honourable Sir* Tho. Robinſon.
* *The Rev. Mr.* John Rawlinſon.
Dr. Ray *of* Brimingham.
Dr. Richard Rider, *Eſq*; Lichfield.
Matthias Ridley, *Eſq*;
* John Reed, *Eſq*;
* *Dr.* Reynolds, *Subdean of* Lincoln.
* Richard Richardſon, *M. D.* North-Byerley.
Dr. Richards *of* Grantham.
Rhodes, *Eſq*;
* Robert Robinſon, *Eſq*; *of* Lincolns-Inn, 6 *Books.*
* Tho. Robinſon *of* Pickering, *Eſq*;
* *Mr.* John Robinſon, *Alderman of* Appleby.
* *The Rev.* Chriſtopher Robinſon, *M. A.* Sheffield.
The Rev. Mr. Ben. Roberts, Sheffield, 1 *large*, 1 *ſmall.*
Mr. Jeremiah Roes, *Bookſeller in* Derby.
Mr. James Rowe *of* York.
* John Roebuck, *Eſq*;
* *Dr.* David Roſs *of* London.
* *Dr.* John Rutherford.
Charles Robinſon *of* Gray's-Inn, *Eſq*;

S.

* THE *Honourable Sir* George Saunders, *Bart.*
* *The Honourable Sir* George Saville, *Bart.*
* *The Honourable Sir* William Stanhope, *Bart.*
* *The Honourable Sir* Hans Sloane, *Bart.* 11 *Books.*
* *The Honourable Sir* Wm. Strickland, *and Secretary at War to his Majeſty,* 2 *Books.*
* John Sambrook, *Eſq*;
* Tho. Salvin, *Eſq*;
Mr. Tho. Satterſal, *Apoth.* Pontefract.
Mr. Richard Sambeck, *Surgeon in* Worceſter.
* *The Rev. Mr.* James Stanley *of* Liverpool.
Dr. Sedgwick, Wolverhampton.
* Franc. Sitwel *of* Sheffield, *Gent.*
* *Rev. Mr.* Wm. Siſſons.
* *Capt.* Wm. Singleton, York.
Mr. Henry Skelton *of* Idle.
Mr. Tho. Slater, *Surgeon and Apoth.* Wakefield.
* *Mr.* Sam. Shore, *Jun. of* Sheffield.
* *Mrs.* Lydia Shore *of* Sheffield.
* Robert Shuttleworth, *Eſq*;
* *The Rev. Mr.* Smaly *of* Cheſterfield.
* *Mr.* John Smith *of* Sheffield.
* John Smith, *Eſq*;
* Ralph Sneyd *of* Keel-Hull, *Eſq*;
* Matthew Snow, *Eſq*;
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THE CONTENTS.

PREFACE.

THE Excellency and Uſefulneſs of Mineral Waters, Page i.
Reaſons for undertaking and publiſhing this Work i, ii, iii, xix, xx, xxi.
But the Uſefulneſs of Mineral Waters depends upon our Knowledge of their contained Principles, and their ſundry Proportions, ii.
Better Acquaintanee with Mineral Waters neceſſary to the Knowledge of diſcovering hidden Minerals, *ibid.*
All Mineral Waters neither equally ſafe nor efficacious in the ſame Diſeaſe, *ibid.*
A double comparative Hiſtory of Mineral Waters neceſſary, *ibid.*
The Mineral Spirit of thoſe Waters and its Effects on our Bodies diſcoverable, iii.
Dr. *Mayow*'s Errors in examining Mineral Waters, iii, iv.
Dr. *Guidot*'s Miſtakes in examining Mineral Waters, iv, v, vi.
Others turn all Examination of Mineral Waters into Ridicule, vi.
Dr. *Hoffman*'s ſcanty and inconcluſive Examination of Mineral Waters, vi, vii, viii, ix, x.
Boyle's Diſcouragement and Difficulties in examining Mineral Waters unneceſſary, x to xv.
Arſenick in Uſe, no natural but a fictitious Body, xi, xii.
Mineral Waters muſt be examined at the Spring, as well as at a Diſtance, xiii.
The Volatility of the Principles of ſome Mineral Waters, xiii, xiv.
Some Principles in Mineral Waters indiſcoverable before Putrefection, xiv.
The Cauſes of our Unacquaintance with Mineral Waters hitherto, xvii.
Dr. *Liſter*'s Errors and Prejudices, xv to xix.
The Knowledge of Mineral Waters uſeful for every Man, xxi, xxii.

INTRODUCTION.

Why Mineral Waters are not beneficial to all, 1, 2, 3.
Many Diſeaſes not curable by Mineral Waters, and why, 7.
The Miſchief of fleſh Suppers and unſeaſonable Hours, and the Neceſſity of ſtrict Regularity with a Courſe of Mineral Waters, 8.
Mineral Waters inſufficient without other Aids, *ibid.*
The Benefit of Exerciſe with them, 10.
Relaxation of the Mind neceſſary, 11.
Why Students more ſickly than Mechanicks, 12.
Why hard Labourers are not to ſpend their ſpare Hours on intenſe Study, *ibid.*

Why and how common Water, wherewith the Minerals are mixed, is ſerviceable, 13.
Which is the beſt common Water, and why, *ibid.*
Properties of common Water, 13, 14.
Common Water when beneficial or hurtful, 15, 16, 17.
What Things Mineral Waters contain not, 17, 18, 19.
What Sulphurs and Nitres they have not, 17, 18.
Why the Proportions of Minerals in the ſame Waters often vary, 20.
How to know when Mineral Waters have ſuffered Loſs by any Accident, *ibid.*
When Mineral Waters become better or worſe by Rains, *ibid.*
Why Mineral Waters vary ſo often in Weight, 20, 21.
Why a formerly common Spring may become medicinal, 21.
Why ſome Mineral Waters may loſe both Vertue and Reputation, 21, 22.

BOOK.

Buxton Waters, their Antiquity proved, 23.
Situation and Extent of *Buxton-Hall*, 24.
Sundry Sorts of Lime-Stone and other Minerals at *Buxton*, 24, 25.
Differences between Shale or Baſs and Slate, 25.
Brazil, its Compoſition and Bubble, 25 to 28.
Peak, its ſundry Kinds of Shells, 28.
Theſe Shells never the *Exuviæ* of Fiſhes, *ibid.*
How to procure Shells out of the Stones, 29.
Wonders of the Peak deſcribed, 29 to 34.
Buxton Diamonds, 30, 31.
Strata of Earths in *Buxton* Coal-Pits, 34, 35.
Shakes in the Earth Cauſe thereof, 34.
Strata's of Earth in *Buxton* Lead-Mines, 35.
Lead-Mines how kept from Damps, *ibid.*
Surprizing Maſſes of Minerals about the warm water Springs, 36.
Conveniences about *Buxton*, *ibid.*
Air and Water at *Buxton* very good, *ibid.*
Firſt Writers on Mineral Waters in *England*, 36, 37.
Buxton warm Waters, their Number and Situation, 39, 40, 41.
Buxton Bath deſcribed, 42, 43. St. *Anne's* Well, 44. *Bingham*, Mr. *Leigh*'s or St. *Peter*'s Well, 44, 45.
Buxton warm Waters examined, 44 to 53.
Buxton warm Springs, the Quantity of Water thrown out by them in any given Time, 48, 49, 50.
The Quantity of Earth and Salts they afford, 48, 49, 50.
The Difference betwixt *Bingham* and St. *Anne*'s Wells, 52, 53.
The Principles of *Buxton* Waters ſhown, 53, 54, 55, 56, 57.
The exact Warmth of each of thoſe Springs, 56.
Extreams of Heat and Cold of Waters in *England*, 46.
Drs. *Liſter* and *Allen*'s Miſtakes on *Buxton*, 58, 59.
The medicinal Effects of *Buxton* Waters, 59, 60.
To what Ages, Sex, and Conſtitutions beſt adapted, 64.
Rules for their Uſe, 66, 67.
To what Perſons and Caſes injurious, 67, 68.
Miſtakes in uſing them. 68, 69, 70.
Matlock, its Situation, 71, 72.
——— Situation of its Springs, 72, 73.
——— Cloathing of its Rocks, 73, 74.
——— Petrefactions, 74, 75, 76, 77.
——— Its Air and Water, 77.
——— Its Waters examined, 80, 81, 82, 83, 84, 85, 86.
——— Principles of its Waters proved, 86, 87, 88.
——— Petrefactions why not hurtful, 89.

——Waters in what Diſeaſes proper, 90, 91.
——Rules for the Uſe of its Waters, 91, 92.
Difference between *Buxton* and *Matlock*, 88.
Balls-Eye Mine, its Hiſtory, 73, 74.
Mr. *Tiſſingtan*'s Letters, 75, 76.
Cobler Mines, Earth, and Minerals examined, 77 to 80.
Middleton Bath, its Situation, Examination, and Uſes, 92, 93.
Wirkſworth warm Waters, 93, 94.
Stony-Middleton warm Waters, their Situation, Principles, and Vertues, 94 to 100.
Bamforth-Hole and *Charleſwork-Hole*, 94.
Different Warmth of all theſe Waters, 100, 101.
Petrefying Water, and their different Petrefactions, 101, 103, 104.
Dropping-Well, its Situation and Uſes, 105, 106.
Band or *Binding* Well, its Principles and Uſes, 107.
Stenfield ebbing and flowing Well, *ibid.*
Principles of petrefying Waters, 108.
Petrefying Waters why improper for Bathing, 109.
——— why not hurtful in the Stone, *ibid.*
——— their Vertues, 110, 111.
——— Rules for their Uſe, *ibid.*
Scarburgh, its Situation, Government, Strength, and Antiquity of its Caſtle, 112, 113, 114.
Writers and Diſputants about its Spaw, 114 to 157.
Neither Dr. *Wittie* nor his Adverſaries proper Judges of the Spaw, 158, 159.
Minerals about the Spaw examined, 160, 162, 163.
The Spaw Waters examined, 163 to 167.
Doctrines from this Examination, 167 to 176.
This Spaw affords no Allum, and why, 170 to 186.
Wherein the two Spaws agree and differ, 172, 173.
The Proportion of their Principles to one another, 174.
Vertues and Uſes of *Scarburgh* Spaw, 176, 177.
Rules for the Uſe of the Waters, 178, 179.
Tonſtal and *Simpſon*'s Miſtakes on this Water, 180, 181, 182, 183.
Spaw not derived from *Tonſtal*'s *Hydrophylacia*, 188.
This Spaw no more petrefying than our beſt other medicinal Waters, 189.
No Breeder of the Stone, or how to prevent it, 189, 191.
Why the Kidneys more liable to Stones, 189, 190.
Cold Bathing when and how uſeful, 191, 192.
Sea Water examined, and Uſes therefrom, 193, *&c.*
Malton Spaw, its Situation, 196. Examined, 197, 198, 203, 207, *Scarburgh* Spaw and it compared, 198, 203, 208. Its Selenites, 204. Difference between its ſtagnant Water and freſh Spring, 204, 205. How its Baſon and Water may be mended, 205. The Principles it contains, 205, 206. Dr. *Liſter*'s Error, 207. This Spaw the ſtrongeſt Chalybeate yet known in *England.* In what Diſeaſes it is proper, 208, 209. Directions for its Uſe, 209, 210.
Stenfield Spaw, its Situation, Diſcovery, and Examination, 211, 212, 213. Miſchief of its large Reſervoir, 212. Its Sediment differs at ſeveral Times, 214. Its Principles, 215.
Aſhwarby Spaw, its Situation, Diſcovery, Examination, Principles and Effects, 215, 216, 217. Compared with its Neighbouring Spaws, 216.
Why all Metals, Iron and Copper excepted, are indiſſolveable in Water, 218, 219.
The *Acidum Vagum* neither yet proved nor convincingly demonſtrated, 220.
Orſton Spaws Examination, Principles, and Effects, 220, 221, 222.
Corrolaries from the Examination of the purging Chalybeate Spaws, 232 to 235.
Number and Situation of *Harrigate* Chalybeate Waters, 237, 238, 239, 240, 241, 242.

Tue-whet and ſweet Spaws examined and compared, 236, 248, to 263.
Why the Reputation of Mineral Waters ſinks, 245, 246.
Sweet Spaw and Alum Well compared, 255.
Knareſburgh Chalybeate, 257.
Corrolaries from the Experiments on the *Tue-whet* and ſweet Spaws, 264, 265, 266.
Neceſſity of Exerciſe, moderate, and in the Morning with Spaw Waters, 267.
Mineral Waters not to be drunk immediately after Meals, nor Meats of hard Digeſtion to be eaten, nor the Uſe of ſeveral Diſhes at the ſame Meal to be indulged, nor late Hours kept, during a Courſe of Mineral Waters, 267, 268.
The Nature and Signs of Chalybeates, 281.
Their Vertue depends on their volatile Parts and Vehicle, and why Drinkers often are diſappointed of Succeſs by them, when they might have it; the ſundry Minerals from which they proceed, 282, *&c.*
Situation, Number, and Differences of *Harrigate* Sulphur Wells, 285, 294, 295.
Harrigate Sulphur Wells examined, 295, 296.
Knareſburgh Sulphur Well, 296.
Sulphur Waters have a mineral Spirit, 308.
Mineral Spirit, its Nature and Effects, 309, 310.
How Mineral Waters may or may not be loſt, *ibid.*
The ſecond Principle of Sulphur Waters, 310.
Fixt Salts in Sulphur Waters, 311, 312.
Sulphur Waters turn extraneous Bodies black, 312.
Sulphur Waters not from the Pyritis, 313.
Characteriſticks of Sulphur Waters, 312, 313.
Earth, the laſt Principle of thoſe Waters, 313.
Great Coldneſs of theſe Waters is from their Salt, *ibid.*
Effects of Sulphur Waters, 314.

APPENDIX.

Difference of the Spirits of Grains and Grapes, 315, 316, 317.
Spirits of the Grape what, 316.
Brandy, Moloſſos, and Malt Spirits compared, *ibid.*
Of the Benefit of Drams, 317, 318, 319.
Of the Miſchief of Drams, 319, 320.
Of Rum, 320. Its Uſes, and where it and Brandy have the Preference, 321 to 322.
How Spirits thicken the Blood, 324. The Effects of White-wine Whets, *ibid.*
The Advantages and Diſadvantages of Arrack, 324, 325, 326.
The Uſe and Choice of Sugar for Punch, 327.
Lemons and Oranges their Uſes, 327, 328.
Punch its good and bad Effects, 328 to 333.
Niſſenius's Epigram on Drunkenneſs, 333.
Of Cyder, 333. Difference between Drunkenneſs with it and other Liquors, 333, 334. Difference between rough and ſweet Cyder, 334, 335.
Sweet Cyder, its good and bad Effects, 335, 336, 337.
Rough Cyder, 337, 338, 339, 340.
Sour Cyder, 340, 341.
Inſipid Cyder, 341. Cyder and Brandy, 341, 342.
Perry, 342.
Mead, *&c.* 344, 345, 346.
Birch Wine, 347, 348.
Gooſeberry Wine, 349.
Curranberry Wine, 350.
Cowſlip Wine, 350, 351.
Orange and Elder Wine, 351, 354 to 358.
Raiſins, 352, 353, 354.
Raſberry Wine, 358.

PREFACE.

IT may here be proper to give ſome general Account of the Nature and Uſefulneſs of our Subject, with the Reaſons why it has been hitherto cultivated to little Advantage. And firſt the Dignity and Uſefulneſs of the Subject, cannot be more emphatically expreſt than in the Words of the Philoſophical Tranſactions, *which run thus, " Whoever diſcovers [a] ſuch " healing Waters, and publickly preſcribes the ſafe and right Uſe of them, " does really diſtribute larger and nobler Alms, than if he built and endowed " a* Savoy; *for this prolongs Life and reſtores Health both to Rich and Poor, " to Natives and Strangers, to Neighbours and Travellers." And Dr.* Fred. Hoffman, *Phyſician to the King of* Pruſſia, *ſays " [b] that Mineral Waters, " both of the hot and cold Kind, are of ſuch Vertue and Efficacy for the " preſervation of Health and cure of Diſeaſes, as in the higheſt Degree to " exceed Shop Remedies, prepared by the niceſt Art; and that he is well aſſured " this Fact cannot be diſputed, but by ſuch as derive their Arguments from their Ignorance and Indolence, and are no ways competent " or experienced Judges in the Caſe." Again he obſerves, " that theſe " Waters approach the neareſt of any thing in Nature, to what has been ſo " much ſearched after,* viz. *an Univerſal Medicine ſuited to the Cure of " all Diſeaſes. And, continues he, " I would fain know whether any Phyſician of practical Knowledge and Experience (in his Art) can ſay of " any other Medicine, what I certainly know to be true of Waters,* viz. *" that they effectually cure both with Expedition and Safety [c]." Laſtly, he adds, " that ſuch Waters are at the ſame time the moſt efficacious and " moſt innocent of all the Medicines hitherto diſcovered, and that they " never fail of Succeſs, when the Phyſician knows how to apply them ſeaſonably and in a right Manner." And this Author's Tranſlator, who prefers a middle Way between ſuch as extol or decry Mineral Waters above meaſure, ſays, [d] " That Nature has done for us all that Phyſicians aim at, by their " Diſpenſatories and Collections of Receipts,* viz. *ſupplied us with a Set of " eaſy, cheap, ſerviceable and ſafe Remedies, ready prepared to our Hands, " in ſuch a manner as the preſent Pharmacy cannot rival." And hence it*

B *muſt*

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[a] Nº 51.

[b] Pag. 5. Of Experiments and Obſervations upon Mineral Waters.

[c] Pag. 102.

[d] Notes on pag. 98.

muſt be owned, that our Subject is one of the nobleſt and moſt uſefull, either in Phyſick or Natural Hiſtory. How extenſive is the Uſe of Mineral Waters at preſent? how ſurprizing are their good Effects? how great the Cures done by them? and might be much oftner, were we duly appriſed of the Manner of their Operation, that is, did we know their Compoſition and Contents, and ſo reſcue their Uſe from the Name of Empirical Practice; *which deſerves no better an Epithet, whilſt we continue Strangers to their Impregnation, Contents, Proportions and Qualities, they being the leaſt ſtudied of any Branch of the* Materia Medica; *and what ſhame is it for us ſtill to remain ignorant of ſo valuable a Part of natural Hiſtory and Phyſick, eſpecially when all other Parts of Learning are making ſuch daily advances? But to put all Recovery of Health, and Prevention or Cure of Diſeaſes out of the Queſtion, yet a better Acquaintance with this would lead us to the Knowledge of natural Bodies, hid in the dark Receſſes of the Earth; for hereby we are led to the Diſcovery of Limeſtone, Coal, Iron-ſtone, Mineral-Salt,* &c. *And no doubt long Practice, cloſe Attention, and diligent Compariſon might let us into the Diſcovery of other Minerals, whether diſſolvable or not diſſolvable by Water. If the Diſcovery of ſuch Waters be ſo great a Benefit to the Health of the Publick, how much greater muſt a true Diſcovery of their real Nature and Properties be? And this alone can enable a Man to preſcribe them advantagiouſly; for as Waters of one kind are found to be an effectual Remedy in ſome Caſes, ſo thoſe of a contrary Nature muſt be dangerous or hurtful in the ſame or the like Diſeaſes; for as nitrous and Limeſtone Waters are found ſerviceable in a Diabetes or other Caſes where the Blood runs off too copiouſly by ſome Secretions; ſo the light, chalybeate, diuretic Waters muſt be miſchievous in the ſame. And as ſtrong ſulphur Waters, loaded with Salt, are the laſt reſort in Cachexies, Cacochymies and Dropſies, where the Lymphatics are not yet broke; ſo nothing can poſſibly be found more pernicious in Hectical, Atrophic, and lean conſumptive Bodies; but of this more afterwards. Again, as ſome Waters are more eligible in ſome Caſes than others; ſo ſome of the ſame kind may be more richly impregnated with the ſame Principles than others. And this leads us to a* Double Comparative Hiſtory of Mineral Waters; viz. *Firſt of Waters of different Kinds, ſecondly of Waters of the ſame Kind, and this latter has been hitherto totally overlooked. Hence ſome Patients have been obliged to drink Mineral Waters four Months, when a Spring of the ſame kind, more plentifully ſtocked with the ſame Principles, would have produced as great Effects in one Month. But ſome may perhaps imagine that the Examination of Mineral Waters is to no purpoſe, as believing it impoſſible to diſcover and exhibit thoſe Materials in them, that work ſuch remarkable Cures. They will ſay it is the Mineral Spirit that undiſcovera-*

ble, intractable, ſubtile, elaſtic Mineral Spirit, which produces the Effect, and that this Spirit can never be diſcovered. I reply, That the Waters conſidered ſimply and excluſively of other Helps, will neither anſwer Character or Expectation; but theſe aſſiſted by Mineral Matters will anſwer both; but what theſe Matters are, we ſhall ſee in the proper Place: Nor can it be denied, that the Efficacy of thoſe Waters in thinning the Blood, and opening inveterate Obſtructions, greatly depend upon the Quantity and Goodneſs of mere Water. And as to the Contents of the Waters themſelves, we ſhould at leaſt know what an alcaline Earth, and a nitrous or marine Salt will do. And as to the Mineral Spirit, it's not only poſſible, but practicable and eaſy to diſcover this volatile Part of Waters. And when I know the Contents of any given Water, and the Minerals from which it ſprings, and by which it's impregnated, and at the ſame time can from Experiments learn what alteration it makes in the Solids and Fluids of the human Body, then I am certain of the Effects of this Spirit; and what further have I to perplex me? Nay more, there are methods of examining Mineral Waters, whereby we find them ſtored with Principles wholly unſuſpected, and utterly concealed from all our Senſes before; and yet the Effects of the Waters cannot be accounted for without them; and are therefore charged ignorantly, or indolently, upon an intractable Mineral Spirit.

Secondly, though many have wrote largely upon Mineral Waters, yet moſt of the Methods uſed in examining them, have been ſo confuſed, inconcluſive, and wide of the Purpoſe, inſomuch that it would be ſurprizing if the Examiners ſhould have made any beneficial or inſtructive Diſcoveries, which we ſhall ſee fully verified hereafter in the noted Controverſy about Scarborough *Spaw, and in ſeveral others. Thus for Example, Dr.* Mayow *on the* Bath, * *tells us, “That becauſe any alcaline Salt mixt with this Water, cauſes a Precipitation, and becauſe, if you pour it into boyling Milk, it coagulates the Milk, therefore that Water contains an acid Salt; and yet that it has an alcaline Salt, complicated with this acid, becauſe its Sediment ferments with Acids.” But had he firſt made the Experiment, he would have found Sea Water coagulate boyling Milk; and that Sea Salt ferments with Oyl of Vitriol; but is Sea Water therefore an acid Salt combined with an Alcali? Again, he ſays, “there is no Nitre in the* Bath *Waters; for if there were, the Salt left upon Exhalation, would burn upon a Coal; tho' he imagines that this Salt, expoſed for ſome time to the Air, might be converted to Nitre.” Strange! that a Man ſhould dream of the Tranſmutation of the Genus of Salts, by being expoſed to the Air! Why did he not try whether by this method Nitre would become common Salt, or Vitriol become Alum or Nitre. Beſides, that Nitre ſhould burn on a Coal, is only to be expected from the Nitre of the Ancients; ſuch*

**Vid.* Guidot de Therm. Brit. p. 43. 44, *&c.*

as is deſcribed by Pliny; *but not our Nitre. And as for Sulphur, ſays he, this Water has none, ſeeing a Solution of Salt precipitates it not. To refute this, I aſk, Do not the ſtrongeſt Sulphur Waters in* England *carry a load of diſſolved Salt in them; and yet is the Sulphur precipitated? Nay, whoever attempted or expected, that Salt ſhould precipitate Sulphur? Again, he ſays, "purely volatile Salts turn the Waters white, and cauſe a Precipitation from the ſtone Powder in them." Sure he never ſaw Ladies and faintiſh Perſons drink Water with Spirits of Hartſhorn, Sal Armoniac or Sal Volatile, or he muſt have ſeen that no Precipitation happened, except there was Nitre in the Water. "The* Bath, *he ſays, turns not Silver yellow but black, therefore it contains not Sulphur; tho' it muſt be owned, the* Bath *has a ſmall Pittance of common Sulphur; but this is ſeparated from the Water, and lies either ſubſided in the Mud, or floating in the Scum." Sulphur being boyled in Lime Water, the laſt becomes white, not by the Affuſion of fixt Salt, but of an Acid." This is a ſtrange Way of reaſoning, there being no truth in the whole, as any one that pleaſes to try will quickly find. However the Doctor will have theſe Arguments ſerve to expel Nitre and Sulphur out of the* Bath; *nor will he allow Vitriol in the croſs and hot* Bath. *What then remains? why truly, Alum and Earth only.*

Dr. Guidot, * *another Writer of ſuperior Note and Diligence, ſets out very unluckily, and makes a trip on the Threſhold, ſaying, "That this Precipitation in* Bath *Waters, from the Affuſion of Alcaline Salts or Spirits, is only fine Freeſtone Powder; being inſipid, gritty Stones,* &c." *But every One knows that the laſt Property, is more applicable to Chalk, Limeſtone, calcined Stone,* &c. *being chiefly Limeſtone, with a little Ironſtone, which is attracted by the Loadſtone after Calcination. The Doctor will have the marine Salt in the* Bath *to be Alcaline; and tho' the Vitriol fly off, both by boyling and ſtanding open, yet he will nevertheleſs have it to contain an acid Salt, becauſe it coagulates Milk; and which he looks upon as an inexplicable Miracle. The* Bath *Water when boyled away, or diſtilled to one fourth, that in the Still will make a Curd, whilſt that in the Receiver will do nothing at all; therefore there muſt neceſſarily be either Vitriol or Sulphur in the remainder of the Water; but it would have been indeed ſtrange had the fixt natural Salt come over the Helm in Diſtillation; or did not ſuch a quantity of Salt coagulate boyling Milk; or to find the Sulphur in the Still, after three fourths of the Water was drawn off. "The Vitriol is exhaled, ſays he, but an acid Salt remains; but of what ſort I cannot tell, only it coagulates Milk. Again, the* Croſs Bath *being drawn, the ſaline Matter not having a due quantity of Water to dilute it, was driven up in ſubſtance, reverberated by the Air, incruſtated on the*

*De Therm. Brit. cap. 4. pag. 49, 50, *&c.*

"*Stones above the Water, which was much alcalizated both by Taſte and Ignition, and from its Pungency and Acrimony, he took it rather for Nitre than Tartar." Now one would wonder how it could come into a Man's Head, to look for Tartar in Mineral Waters, and not as ſoon think of Sugar or Salt of Wormwood, all three being Vegetables, not Mineral Salts; or how was it poſſible to gueſs whether the Salt was acid or alcaline, before he had ſeparated it from the Stone Powder, which* there *is a moſt alcaline Earth, or ſhould he expect it to incruſtate on the wet Walls, had it all been Salt?* "*After the Nitre was ſpent, ſays he, by the Sediment's being poured on Iron after burning, the alcalizated Taſte was more remarkable, and further confirmed by its Crepitation and Pungency." Contradictions with a Witneſs! it's an acid Salt, becauſe it coagulates Milk; it's a highly alcaline Salt, becauſe it crackles and flies on a red hot Iron; when both are Characters of common Salt. To what end ſerves a Thouſand ſuch Experiments, when Concluſions are drawn flatly oppoſite to the Indications?* "*It's trifling, ſays he, to tell me, that what is diſſolvable in Water, the Pores of it will receive, till it can hold no more: how can there be juſt ſo many Poroſities in the* Bath *Water, aſſigned for Vitriol, and the reſt taken up by other Bodies? I am ſatisfied to the contrary, that is, from Theory not Practice, this is indeed giving defiance to both the Judgment and Senſes of all Mankind. Do we not find Salt, Earth, Stone-powder,* &c. *lodged in the Interſtices of Waters? do not we ſee from Experiments, that the Poroſity of Water is to its Parts, as* 39 *to* 1*? are not the Particles of Water globular? and can Bodies of that Figure poſſibly touch in any more Points than one? hence the greateſt Poroſity; why then may not any Body, whoſe Parts are ſmall enough to be ſupported by Water, lye in it's Interſtices? and when theſe Stones are filled with Particles of one Figure, are there not ſtill empty Interſtices left for Particles of another Figure, and after that for a Third? When a thinking Man reads ſuch Stuff in grave Authors, it's almoſt natural to believe, that either they wrote on purpoſe to deceive, or never deſigned their Writings to be inſtructive and uſeful, but took all this Pains that they might not ſeem idle. Becauſe the* Bath *Water coagulates Milk, therefore it muſt have Vitriol in it; but do our beſt light Chalybeats, as* Pyrmont, German Spaw, Tunbridge, &c. *coagulate Milk? or rather do they not retard its Coagulation a Day or two beyond its ordinary time? He told us before, that the Vitriol ſpent its ſelf either by Exhalation or Evaporation; but here it's come again to coagulate Milk. Pungency and Acrimony ſtand with him for the Characters of Nitre, tho' common to all Salts. Crepitation and Pungency paſs for the Marks of an alcaline Salt; tho' the firſt is peculiar to Marine Salt, and the other Common. Again, the* Bath *muſt contain Nitre, becauſe its Salt is bitter; tho' this is proper to that*

that Part of Sea Salt called Bittern, *which is ſold in the Shops under the Name of* Epſom *Salt. It muſt alſo be Nitre becauſe it's Purgative, but does not Sea Salt purge alſo?* " *As for Sulphur, he is ſure, it's there, both* " *from the Colour, Smell, and Calcination of its Contents, but being* " *incorporated with the Salt, both paſs the Filtre, go into the* Lixivium, *and* " *the firſt is not diſcoverable but by a ſtrong Fire opening the Salt and* " *cauſing a Solution of its* Continuum". *Sulphur cannot be ſeparated from the Salt but by a ſtrong Ignition. Strange! Sulphur indeed if thus inſeparably attached to the Salt! tho' always hitherto wanted among the volatile Principles, which would not bear Exhalation, much leſs Ignition, but by ſome Accident is here ſo fixt, that its Separation requires a Force of Fire equal to that of the Purification of Metals, a Work very improper for animal Bodies: Tho' I am well ſatisfied that ſome Part of the Sulphur in Sulphur Waters is ſo fixt to the Salt, that they are inſeparable before Ignition, but what a poor Pittance is that, and by no means to be taken for the whole: Tho' the Doctor's Writings are voluminous upon one Water, yet from theſe Specimens, we ſee with what want of Judgment his Experiments were made, and how inconcluſive his Arguments which are drawn from them.*

But we have yet a later Author, who ridicules all Attempts toward a Diſcovery of the Contents of Mineral Waters by any Experiments, yet in Compliance to the preſent Mode, and out of his ſuperabundant Goodneſs, vouchſafes to give us a Scantling upon a medicinal Spring of no mean Character. The Sediment remaining after Exhalation, he tried with Oils of Vitriol, Sulphur and Tartar (becauſe this was ſooner done than ſeparating the Earth and Salt, and ſetting the laſt to cryſtallize) with the firſt two, it raiſed a very ſtrong Fermentation, but not with the laſt. He takes Care not to tell us whether it was the Salt or Earth, or both that fermented. He tried the Water with Galls, Balauſtian Flowers, Sublimate &c. *but draws no Concluſion from any Thing; only quarrels with another Author, who had obtained* 40 *Grains of Sediment from a Gallon of the Water, and he could procure only* 36 *Grains; and becauſe the firſt ſaid, that when the Water had ſtood* 24 *Hours with Powder of Galls, it turn'd green; but he found it continue of a muddy White. The ſame Reaſon have I to be angry with him, for I could get but* 30 *Grains of Sediment from a Gallon of Water, and becauſe it did turn green with Galls, and yet I am ſatisfied we all write as we found it, the Reaſon whereof we ſhall ſee afterwards.*

Let us deſcend to an Author of ſtill greater Note, viz. *Dr.* Frederick Hoffman. " *He ſays, the Proofs of an alcaline Salt in Mineral Waters are,* " 1. *Their Conflict with Acids.* 2. *The Solution of their Salt in Water turns* " *Syrup of Violets green.* 3. *The ſame Solution with Spirit of Vitriol makes*

“ *Tartar vitriolated.* 4. *This Solution turns a Solution of ſublimate Mercury* “ *yellow,* &c. *Here we are to try theſe Experiments with the Sediment in the Groſs, a great Part whereof is Limeſtone Powder, which cannot poſſibly fail to ferment with Acids, nor to turn Syrup of Violets green. He ſays,* [*] “ *three pints of* Pyrmont *Water exhaled, left only* 40 *Grains of* “ *Sediment, which was an alcaline Salt, and fermented violently with Oil* “ *and Spirit of Vitriol.*” *I took care to procure a Bottle of this Water genuine, exhaled three Pints of it, and had* 72 *Grains of Sediment, whereon I poured warm Water, then gave it a double Filtration, and procured* 30 *Grains of beautiful white Salt, which fermented neither with Oil, nor Spirit of Vitriol, nor Oil of Tartar, nor Spirit of Hartſhorn; Spirit of Salt poured upon it, after they had been mixed a Moment or two it ſmoaked, this Spirit poured upon clean China, or its Bottle uncorked did the ſame; ſo that we cannot allow this for a Fermentation, tho' any of the Acids dropped upon its Earth, cauſed a vehement Ebullition. This is the Effect of examining Sediments by the Lump, only to ſave a little Labour and Time. It's evident that this Water containing ſo much Salt, a large Quantity of it drank muſt open the Belly, only from its Salt, and not the Doctor's Philoſophy. Now the fixt Contents muſt be the ſame in* England *as at the Spring, the Water having not been corrupted or ſpoiled. In another Place* [†] *he tells us, that all the* Acidulæ *contain a pure alcaline Salt, which raiſes a Conflict with any Acid; from which it's very plain, he either tried few, or made his Experiments on the whole mixt Sediment. Nor can I find that he has been at the pains to cryſtallize any one Salt, but taken their Genus's on ſlight and unſatisfactory Evidences; for I have ſeen few or none of the refined Salts of thoſe Springs, that would raiſe a briſk Ebullition with Acids. His whole Hiſtory is too ſhort, his Experiments too few, his Concluſions meanly grounded, and not fully eſtabliſhed. He ſays the Waters of* Egra *are chalybeat, yet neither Salt nor Earth ferment with Acids, then it cannot be alcaline, tho' not common Salt. It muſt be owned that* Hoffman *affords more Truth and greater Certainty toward a natural Hiſtory of Mineral Waters, than all his Predeceſſors together; for tho' a Chymiſt, he retains the leaſt of their Dialect of any, and tho' a good Philoſopher, yet advances the feweſt, and is the leaſt attached to Hypotheſes and Speculation, of all that have wrote on this Subject; but it's to be wiſhed he had been more conſiſtent with himſelf: For in one Place,* [a] “ *he lays the Miſtakes of* “ *preceding Writers on Mineral Waters on their want of Knowledge in* “ *chymical Operations*”, *and* [b] *that he muſt have Recourſe to Chymiſtry; but afterwards,* [c] “ *he gives the chymical Analyſis of Mineral Waters for* “ *one of the four cardinal Errours, which have prevailed to their Diſcredit.*” *Where he explains the Origin of the Mineral Spirit in Waters,*

[*] p. 61.

[†] p. 5.

[a] p. 12.

[b] p. 30.

[c] p. 110.

[a] p. 30. *he* [a] *ſays,* “ *this extream moveable, ſubtile and elaſtick Spirit is a Portion of the*
“ *univerſal Spirit, the Fountain and Cauſe of all particular Spirits in other*
“ *Things, whether in the vegetable, animal, or mineral Kingdoms*”. *But*
this Spirit has its principal Seat, and exerciſes its Powers chiefly in Sul-
phur. Which Diſtinction and Account of the Origin of the Spirits in Mi-
neral Waters, in this diffuſive and unlimited Senſe, are manifeſtly ridiculous.
[b] p. 141. *But when he lays aſide his chymical Cant, and talks intelligibly,* [b] *then he*
tells us, “ *that this Spirit is the Vapour that ariſes from heated or burning*
[c] p. 66. “ *Marcaſites. Spirit of Vitriol poured into the Water of* Egra [c] *raiſes a*
“ *manifeſt Ebullition, but when he had exhaled the Water of* Egra *and*
“ *poured Oil of Vitriol (which is a ſtronger Acid than the Spirit) upon its*
[d] p. 67. “ *unſeparated Sediment, there enſued no Struggle or Effervescence*”. [d] *This*
is ſurprizing, that the Water ſhould ferment with a weaker Acid, and not
the Sediment with a ſtronger. But he is ſtill more out in what follows,
viz. “ *which ſhews this Water contains no Proportion of common Salt; now*
Oil of Vitriol dropped on common Salt, raiſes a very great Effervescence.
Take this Hint once for all, that whenever he ſeparated the Earth and Salt,
then found the laſt Ferment with Oil of Vitriol, it's an alcaline Salt with
him, when in Truth it's a certain Mark of common Salt; and this Miſtake
[e] p. 5. *he could not avoid except he had cryſtallized the Salt. He ſays,* [e] “ *the*
“ *Virtue of all purging Waters depend upon a certain neutral cleanſing*
“ *Salt.*” *But the Waters of* Swalback *ferment with Acids, are therefore*
[f] p. 72. *alcaline, and yet purgative;* [f] *but this Quality depends upon his Philoſophy,*
viz. *the fine mineral Spirit, and ſubtile irony Principle; but let him ſe-*
parate the Salt, and if it purge with the other Principles, and his Philo-
ſophy into the Bargain, except drank in unreaſonable Quantities, I will
own my ſelf fairly in the Miſtake; or otherwiſe all theſe Waters highly im-
pregnated with a mineral Spirit and irony Principle, but very little Salt,
ſhould purge, which is true of none of them. He is very ſanguine againſt
[g] p. 104, 105. *the Exiſtence of ſolid or fixed Vitriol in Mineral Waters,* [g] “ *is poſitive it*
“ *can be proved by no Arguments nor Experiments, that a Grain of it can-*
“ *not be procured from a hundred Pints, and to aſſert the contrary is an*
“ *Errour in the Examiner from his want of Knowledge in Chymiſtry.*” *It*
might be a ſufficient Anſwer to this, ſhould I ſay, I know of no Diffe-
rence betwixt fixt and volatile Vitriol, but the ſmallneſs of their Parts,
one conſiſting of ſuch ſmall Particles as are capable of Elevation in the
Air, either upon being long expos'd thereto or warmed by the Fire; the
other being groſſer endures the Force of Exhalation or Diſtillation, but
the Principle is the ſame; but more directly, there are Mineral Waters
which contain fixt Vitriol, a pregnant Inſtance whereof we have in Malton
Waters, and all the coal Waters in this Country contain fixt Vitriol only.
And

And as there are different Degrees of Volatility of this Principle to be met with in Mineral Waters, I do not apprehend the Abſurdity of ſaying it ſometimes exiſts in ſo large Particles, as to endure the Force of Heat in Exhalation. No Phyſician can be preſumed ignorant of the Uſefulneſs of Sulphur and Steel in Medicine, and Vitriol is acknowledged a Compoſition of thoſe two; why then muſt it be ſo injurious when fixt, and yet ſo advantageous when volatile? I can aſſign no other Reaſon than that one ſits eaſier upon the Stomach, goes ſooner off and invigorates the Body more ſenſibly than the other. He had told us before [a] " *that if any Vitriol* " *remain behind after the Evaporation of the Waters, it may properly be* " *called fixed; and indeed there are ſome chalybeate Waters which afford* " *a very minute Parcel of this fixt Vitriol, obtainable by a particular* " *Encheireſis*". *Hereby I ſuppoſe he means that of putting ſteel Filings into the Water before it's warmed. This I tried with the light Chalybeates, but procured no fixt Vitriol this Way. But how are we to know the Water that has this fixt Vitriol,* " *they turn Inky, not only with Galls, but even* " *with Oak-Leaves, Pomegranate Bark, Extract of green Tea,* &c. *But this is too great a Conceſſion to be ſtood to: Afterwards he tells us another Story;* [b] " *but for a fixed Vitriolic Salt, capable of enduring the Fire (by* " *heating only) no ſuch thing is to be found in mineral Waters*"; *here he is obliged to* Dr. Liſter, *who having inadvertently laid down this Aſſertion, how is he perplext about* Malton *Waters, where he finds fixt Vitriol? Then rubbing the Veſſel with a Plume of Alum muſt ſalve the Miſtake; but if you carefully cryſtallize the Salts of that Water, you ſhall have plenty of Nitre, and Vitriol in Bubbles lying between them, but not a Grain of marine Salt: But if they contain no Vitriol, or if the Nature and Operations of volatile and fixt Vitriol are entirely different,* [c] " *or if the firſt is* " *really ſomewhat of an irony Nature, which joyned with a ſulphureous* " *Spirit, reſembles common Vitriol only in Taſte and Colour, without any* " *farther Approaching to the Nature thereof*"; *how is it that* Harrigate *Alum Spring (falſely ſo called) has under it's Baſon between the Clay and Moſs, ſeveral Cart-Loads of pyritical Concretions, bred purely from the Ouzing up of this Water: which Tranſudations have petrefied the Moſs, withered Graſs and ſtick Roots, but poudered and infuſed in warm Water, a great Part is diſſolved down to Vitriol, and yet the Water preſently loſes it's tincturing Property with Galls.* " *In Fact there are very few hot* " *Springs that contain Sulphur at all, and except one or two there are* " *not the leaſt Marks of it diſcoverable in the reſt;* [d] *and he has with the* " *utmoſt Exactneſs examined ſuch Waters as run hot and with an abominable Stench like that of rotten Eggs, but never could diſcover the* " *leaſt Grain of Sulphur in them. It's Marcaſites therefore* [e] *abound plen-*

[a] p. 51.

[b] p. 146.

[c] p. 105, 106.

[d] p. 156, 157.

[e] p. 140.

“ *tifully in the Earth and conſiſt of Iron and Sulphur, wrought into a Maſs; it's obvious to conceive that a large Bed of them lying under Ground, and being moiſtened by the Water that runs over them, will produce a Diſſolution of the Principles whereof they conſiſt*”. *Well; if the Marcaſites which heat the Water, conſiſt only of two Principles, and theſe two are not ſeparated but both diſſolved, what's become of the Sulphur and Vitriol? why are they not brought to us by and in the Water; or what other is it than a ſulphureous Principle that gives the Water this fetid diſagreeable Smell, as well as the Vitriol gives them this rough harſh Taſte; or whence came the ſeveral Pounds* “ *of ſublimed Flowers of Sulphur ſticking to the Arch and Top of the Well-Room of* Aken, *or at* Aix la Chapelle”. *&c.*

That learned and indefatigable Inveſtigator of Nature, the honourable Mr. Boyle, *in his Eſſay towards a natural Hiſtory of Mineral Waters, ſeems to have given the greateſt Diſcouragement to the Naturaliſt's Work of examining their ſeveral Properties; for by his Methods a conſiderable Part of human Life is ſcarce ſufficient to examine one Spring; and after all he alledges* “ *an Inveſtigation of them to any Satisfaction, little leſs than both impoſſible and impracticable; he lays in the Way ſuch Bugbears and frightful Apprehenſions, innumerable and inſuparable Difficulties, Hopeleſſneſs of Succeſs, Deepneſs of the Receſſes, Profundity of the Abyſs, unſearchable Mixture of infinite Variety of Matters and Bodies, endleſs Combinations, Compoſitions and Intermixtures thereof, Greatneſs and Expenſiveneſs of the Work,* &c”. *But if we attend a little more cloſely, we ſhall find ſeveral of his Requiſites unprofitable or foreign, as well as tedious, and that he is frightful and apprehenſive where there is not the leaſt Cauſe of Fear. What could poſſibly diſcourage a Man more, than to be told by ſo great a Perſon at his firſt ſetting out,* * “ *that there are beneath the Surface of the Earth divers mineral Subſtances, ſome fixt, and ſome volatile, ſome in Form of hard Bodies and ſome of ſoft ones; ſome of Liquors, ſome of Fumes, divers of which the Generality of learned Men are Strangers to, beſides thoſe that tho' ſome Men may have chanced to have ſeen, have their Natures ſo little known, that they have not ſo much as Names aſſigned to them; ſo that conſidering the Ingredients we are unacquainted with, (to paſs by all the reſt that the Earth may conceal) the Proportions wherein they are mingled may be numberleſs, and the Qualities reſulting from thoſe Commixtures may be very different from thoſe of the ſeparate Ingredients; ſo that the Difficulty of ſecurely determining the Effects of Mineral Waters a* priori, *is little, if at all leſs than inſuperable to human Underſtanding*”? *This certainly carries great Weight with it, eſpecially conſidering from whence it comes; and the*

* Sect. 2.

Difficulty is ſtarted from the Impregnation of Waters with mineral Subſtances, of different Kinds, Conſiſtency and Commixtures. But it's worth our Inquiry whether theſe Subſtances, in their natural State, are diſſolvable and commiſcible with common Water, or not; or whether any or all of them are diſſolvable? are they diſſolvable with or without a Medium? have all the Metals, Minerals and Foſſils through which the Water is ſtrained and by which it's impregnated, been ſearched, known and examined? are their Effects, whether ſeparated or combined, known upon human Bodies? ſure it's not impoſſible for human Underſtanding to find out and determine theſe. If they are ſuch as are indiſſolvable, it may indeed be puzzling to human Underſtanding to find out that in Waters which never was, and cannot poſſibly come into them: Or are they ſuch Subſtances as are only diſſolvable by the Help of a Medium, Menſtruum, *or third Body; is that third Body there and what is it? But his Error lay in imagining Bodies diſſolvable which are not, as Gold, Silver, Tin, Lead,* &c. *and in apprehending there might be more Diſſolvents than really are, for we find none beſides Vitriol. The Water indeed wears off and carries away in it's Boſom ſome Part of the Bodies of a looſer Texture, as of Earth and Stone. But theſe are viſible upon Exhalation: For Nitre and Sea-Salt cannot diſſolve Metals, before thoſe Salts by Chymiſtry be changed to an acid Spirit. From a Fear that Mineral Waters might be impregnated with Orpiment, Arſenic, and the like poyſonous Minerals, which really are not natural but artificial; for kind and wiſe Providence has ſo order'd it, that if there ſhould be dangerous Minerals in that Earth through which thoſe Waters are ſtrained, yet while at Reſt in their natural State, they are indiſſolvable, and therefore cannot hurt. Some Hiſtorians, as* Pliny, *tell us of Waters that fuddled the Drinkers; but this is common to all ſuch as are richly impregnated with a mineral Spirit. They tell us alſo of other Waters that kill; and this ſome may do without any Poyſon, as when they abound with a mineral Spirit and a chalybeate Principle at the ſame Time, if drunk immoderately, in hot Weather eſpecially, they may rarify the Blood, and in ſanguine Conſtitutions occaſion Fevers and Hemorrhages. Strong purgative Waters may cauſe a Superpurgation; a Caſe which we have ſeveral Times ſeen: Waters impregnated with Vitriol or Copper, a Vomiting; but this is excluded the Claſs of medicinal Mineral Waters: Hot Sulphur Waters a Fever and Death. Yet here is no Poyſon in all theſe, farther than Want of Judgment and Diſcretion in the Drinker. I know it has been a common Thing both with Naturaliſts and Phyſicians, to impregnate Mineral Waters with imaginary, not real Principles; and have ſcarce left a Metal, Mineral or Foſſil, which ſome Spring or other ſhall not contain: Hence, are they in continual Fear about their Effects, and in the utmoſt Uncertainty* *about their Uſes and hurtful Conſequences, when in Truth it's their own fruitful Fancy, not Nature, that impregnates them with Poyſons; for all owning Arſenic, Orpiment, (or if there are any other more frightful Things than thoſe) to be in the Bowels of the Earth, through which our medicinal Water is ſtrained; yet ſince the Former of all things has ſo order'd it, that the Water neither diſſolves nor imbibes any of them, but as tho' it were indued with a rational deliberative kind of Choice, it only diſſolves of its ſelf and brings along with it ſuch Principles and Ingredients, as are highly conducible to the Health of human Bodies. But let Orpiment and Arſenic be as dangerous as they are repreſented, yet they were always owned to be ſo when given in Subſtance, not in Infuſion or Tincture drawn in ſimple Water. But finally to put the Matter out of Doubt, hear* Kunkelius, [a] *and* Boerhaave *in his Chymiſtry,* “[b] Auripigmentum *ſhews its ſelf in ſeveral Things like Sulphur, it's friable, fuſible, eaſily inflammable, has a ſulphureous Smell tho' no volatile Acid, inert, innocent, not injuring the Bodies of Animals, as is vulgarly reported and believed, becomes red by Fuſion, and then, but not before, diſcovers a volatile emetic Quality; it's improperly called yellow Arſenic. This native* Auripigmentum *fuſed in a cloſe Veſſel on the Fire, gives a friable Maſs, and eaſily may be reduced to Powder, of a Minium Colour, not very ſharp, nor ſo very poyſonous; this by both Ancients and Moderns is called Realgar, red Arſenic, Sandarach,* &c. *Which Confuſion of Words has occaſioned ſeveral Errors, but the preſent white cryſtalline, ponderous, friable Arſenic, that's ſold now, has not been known above two hundred Years, and is an artificial Body; for whilſt the Fuſion of Cobalt with a fixt alcaline Salt and Flints is preparing for Smalt, the aſcending Flower gives crude white Arſenic; which put in a cloſe Veſſel and fuſed in a ſtrong Fire, yields the Arſenic ſold in the Shops; but if this Flower of Cobalt be fuſed with a tenth Part of common Sulphur, we have the yellow Arſenic of the Shops; which ſhould be carefully diſtinguiſhed from* Auripigmentum, *ſeeing it's irreſiſtibly fatal; but when the ſame Flower of Cobalt is fuſed with the Mixture of one fifth Part Sulphur, this produces our common red Arſenic; and for the ſame Reaſon ſhould be well diſtinguiſhed from that of the Antients: Wherefore our Arſenic reſembles not Sulphur ſo much, but has a peculiar Quality proper to its ſelf only, unknown to the Ancients, fatal to all Animals, and not referable to any Genus of known Bodies". What does it amount to if under the Earth's Surface ſhould be hid ten thouſand times more Metals, Foſſils and Minerals, and theſe ten thouſand Times more compounded than they are, when I am ſatisfied that few of theſe are diſſolvable in Water, and that theſe few are inveſtigable? If by Effects upon human Bodies, he underſtands*

[a] De Arte vitraria.

[b] De Sulphure.

derſtands their particular Manner and Degree of Operation, I ſhall join with him; for allowing a Man ſhould know both the Kind and Quality of Salt impregnating Mineral Waters, yet it is difficult he ſhould preciſely determine the Time, Manner, and Degree of their Operation either by Stool or Urine; this is not what we pretend to in the Uſe of the beſt known Catharticks and Emeticks, or Diureticks. But if he mean that it's impoſſible to determine before hand, whether the Alterations theſe Waters ſhall make upon the Body, by their Operation or Alteration, ſhall be good or bad, hurtful, advantageous, or neutral, when I am apprized of their Nature, from an Acquaintance with the Kind and Quality of their fixt and volatile Parts, and have the Caſe and Conſtitution of my patient plain before me; I muſt beg leave to be excuſed, if I think it not humanly impoſſible to tell, whether the given Water will be of Service or not. But what follows [a] *might be one Cauſe of leading our Author into this Miſtake, where he ſays* “ *the* “ *Experiments made on Waters after they are taken out of the Spring, is* “ *what's moſt wanted by Naturaliſts and Phyſicians, and the moſt inſtruc-* “ *tive to them, and to make theſe, it's not neceſſary that a Man repair to* “ *the Place, but may at Leiſure examine the Water at Home, where he* “ *has Conveniencies.” But why not neceſſary? he ſure did not conſider that the Spirit and volatile Principles of Mineral Waters, are by far the moſt effectual Parts, and it's impoſſible to carry thoſe away from ſeveral Springs.* Briſtol, Buxton, Matlock *and* Stony Middleton Waters *had loſt them when they came at my Houſe; nay ſeveral Waters loſt their fineſt Principles, by carrying them a little Way, and keeping them only a ſhort Time.* Scarborough *at the Spring head weighs lighter, ſtrikes a Purple with Galls, and is more Diuretic; but when carried ſixty ſix Miles in cloſe corked and well ſealed Bottles, and laid only three Nights by the Way, Galls turn'd it of a muddy pale White, and in one Night's Time turn'd it Green throughout: Here both its Spirit and Chalybeate Principle were gone.* Ranfield *Spaw chalybeate was quite loſt in three Hours and ſix Miles carriage.* Long Addingham *and* Carleton *loſt theirs in twenty four Hours. All the ſimple Chalybeates, which in many Caſes are the moſt Powerful and Succeſsful, being impregnated with a volatile Vitriol only, a little Ocre, and perhaps not a Grain of any Salt in two Gallons of them, yet by Carriage they loſe moſt if not all of both Principles, and then they are worſe than common Water, very unfit for medicinal Purpoſes, or to paſs an Examination of them at Home. The Reaſon of thoſe different Degrees of Volatility of the vitriolic and ſulphureous Principles, ſeems to be, as the acid ſulphureous Spirit exhaling is weaker or ſtronger, and the vitrioline Particles are groſſer or finer, leſſer or greater, and the Connection of thoſe two is cloſer or looſer, ſo the Principle produced from this Exhalation will be more*

on

[a] Sect. 4.

or leſs Volatile. Hence I have obſerved that the ſloweſt or weakeſt Chalybeates, or Sulphur Waters, abound moſt with the more permanent Chalybeate or ſulphureous Principle. It requires a great deal of Patience and Nicety to diſcover the chalybeate Principle in Matlock *Waters at the Spring Head, but impoſſible when quite cold.* Kedleſton *is the ſtrongeſt Sulphur Water in* Derbyſhire *at the Spring, but when carried only five Miles and kept one Night in a clean well corked Bottle, its Smell was much weakened, nor would it change a Chalybeate Water to a purple Colour, tho' it did it in a Moment at the Spring Head: On the contrary; ſome Waters contain ſome Principles utterly indiſcoverable, either at the Spring Head, or at a diſtance, before they are arrived at the higheſt Degree of Putrefaction they are capable of; thus* Scarborough *diſcovers not its Sulphur till then. He ſays,* “ *the* Acidulæ, *ſo called from their acid Taſte*[a], *are what he's moſt converſant in; but I have not been able to diſcover the leaſt Acidity in any of them, Coal Waters excepted; but the rough, harſh, Irony Taſte of theſe Waters, has always been taken for an Acid.* Scarborough *Water* e. gr. *has by all been ſaid to be poſſeſſed of an Acid; but let it ſtand a few Hours, till its vitroilic Principle be gone, and its a ſaltiſh ſweet Taſte, the ſame with a farrow Cow's Milk*[b]*: nay their turning green with Syrup of Violets, their Ebullition with ſtrong Acids, and their intolerable Putrefaction on long keeping, are Characters utterly incompatible with any Acidity. But their curdling Milk and Soap, has given a Handle to this Notion of their being of an acid Nature; but do not all Salts the ſame, when Water is full of any of them, even Sea Salt itſelf, tho' it ferments with Acids, and is therefore called an alcaline Salt by ſuch as had not Patience to cryſtallize it, and therefore* “ *will have it to proceed from the mineral Spirit theſe* “ *Waters contain, which by means of its latent Acid, joyning itſelf* “ *with the calcarious Earth they abound in, thus degenerate into a* “ *Salt, reſembling alcaline Salt*[c] &c. *and then confound it with a volatile Nitre. He ſays,* “ *Miners have met with running, as well as ſtagnant Waters, ſome*[d] *whereof have been miſchievous, as corroſive, petrific,*” &c. *True, where Nitre and Limeſtone abound, there may Petrefactions be found; but for natural Corroſives, I know of none ſuch, except Vitriol deſerve the Name. But that the Waters in the Bowels of the Earth, where Men are at Work are changed, is no Wonder, when Pieces of Minerals, Metals, Foſſils, Salts, Stones and Earth are in Subſtance mixt with the Waters; but what is this to Natural Springs? People are not to drink out of Soughs and Levels.* Wirkſworth *in* Derbyſhire *formerly had a very pleaſant, pure and wholeſome warm Spring, yet in tearing to Pieces the Bowels of the Earth in ſearch of Lead, they loſt both that, and moſt of their other Springs, and have now two warm Brooks, being old Soughs made to drain*

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[a] Sect. 5.

[b] A Cow's Milk that's near Calving.

[d] Hoffm. p. 143.

[c] Boyl. viz.

the Water from their Works, which ſtill bring abundance of ſmall Lead in them, tho' the Works there have been ended many Years ago. As to the Climate and Latitude in which Mineral Waters ſpring up, the carrying and uſe of a Quadrant may ſatisfy the Curious; but they will meet with the ſame ſort of Waters in different Latitudes. As to the Quarter of the Heaven, the Height or Depth of the Hill, Mountain, Valley or Marſh, where the Mineral Water ſprings up, theſe are very trifling; the principal Uſe of theſe, ſeems to be to recover the Spring again if loſt, and therefore the Examiner ſhould be exact in this to a Foot. As to ſubterranean Fires with manifeſt Chimnies, with or without Flowers of Brimſtone, we have none, therefore ſeek after none, having traced ſome of our warm Waters to the Spring Head under ground. As to the ſundry tedious Ways of Diſtillation, we know that the common volatile Parts will fly off every one of them, the Heat further rarefying and volatilizing its Parts, more than Carriage or cloſe keeping; therefore all we have to expect from this trouble, is perhaps ſome little groſſer Sulphur, or a little Vitriol, the firſt diſcoverable from its yellow Colour in a Receiver, the laſt from its turning Purple with Galls, both which are as certainly diſcovered with leſs Labour. As to Tryals by Ignition, Reverberation, Elixation, &c. *theſe only aſſiſt in diſcovering the Metal or Earth mixt with the Water; and if there is any great Knowledge to be gained that way, it may be had at much leſs expence: And as for Metals, I will anſwer for it, they ſhall meet with none, except Iron or Copper, and theſe we hope to diſcover with leſs Fatigue and Coſt; as to Arſenic, they may ſpend their Days about Fire and Furnaces, and not find that. And by theſe violent Methods, the Salts, if ſtill mixed with the Earths, will be ſpoiled. As to the Taſte of Waters, I lay aſide his vinous Acid, acerbous and bitter; being out of hopes to find any medicinal Waters of thoſe Taſtes. The other Taſtes muſt be expected to vary from Carriage, long keeping, warming and cooling again, freezing, being negligently or carefully corked up,* &c. *As to the Colour and Quantity of their earthy Contents by long ſtanding, diſtillation, ſeveral boylings,* &c. quorſum hæc? *all this is done at once by boyling them ſlowly in a clean Veſſel, over a very clear gentle Fire, and carefully obſerving how and what Sediment they let fall, and what ſeeming Proportion this has to that after boyling.*

The next Writer of conſiderable Note is Dr. Martin Liſter; *he was an excellent Naturaliſt, and ſeems to have been encourged by the* Royal Society, *upon the great Diſpute that had happened about the* Scarborough *Waters: His main Deſign was to have diſcovered the Genus of impregnating Salts in the Groſs, and had his Application been equal to his Capacity, we might have expected greater Things from him; but he being no great Favourer of*

Mineral Waters, contents himſelf with a ſlight Examination of thoſe, chiefly about which the late Quarrel had happened, viz. Scarborough, Malton, Harrigate, Buxton, *and* Knaresburgh *dropping* Well; *from theſe he draws a Concluſion,* "*That all the Medicinal Springs of* England, *tho' almoſt infinite in Number, yet contain only Lime-ſtone-ſalt, and common Salt. Vitriol they have none. The ſtinking Waters contain only common Salt, and nothing beſides a ſulphureous Vapour or* Halitus, *only occaſioned by the Pyrites, for the Water ſtagnating in its ſubterranean Channels upon the Pyrites, acquires this Smell, and all thoſe Springs are either of a very ſlow Courſe, or ſtagnate.*" *Now this Pyrites is all ſorts of Iron-ſtone; it conſiſts of Vitriol and Sulphur only, and it's wholly diſſolved in the atramentoſe Waters, and yet theſe Waters contain neither Vitriol nor Sulphur, except only a bare Vapour. Here is Cunning indeed, that carries off the Solution and not the Solvent.* "*Were Sulphur Waters kept often upon the Pump, and much drawn, they would not ſtink at all; for it's their Stagnation that's the Cauſe of their Smell; and all* Acidulæ, *the Atramentoſe eſpecially, if they are kept bottled up for ſome Time, ſend forth the ſame ſulphureous Smell, as* Harrigate *Sulphur Water; but yet all theſe kind of Springs have a whitiſh Flower on their Surface; and this Flower is Sulphur, their Stones are died Purple, and their Waters turbid and muddy*". *This is ſtrange! Sulphur, yet no Sulphur; a fetid Smell from Stagnation; a mere* Halitus, *and yet a viſible, palpable Subſtance; and all from the Pyrites, a Name without any definite Signification, what was formerly called the Fireſtone, or Stone upon ſtriking with Steel, threw forth ſparks of Fire; but now alienated to ten thouſand different Bodies, every Subſtance containing Iron, being ſo called by him; and in this Senſe, Coal, Hopp-aſhes, Clay, and by his own Words the* Calculus humanus *is a Pyrites; a ſtrange Confuſion of Terms! But the Pyrites is the moſt monſtrous Creature, being it diſſolves, annihilates and regenerates it ſelf, is the Cauſe of chalybeate, ſtinking, purging, hot, tepid, and all other medicinal Springs, is diſſolved in them all, and yet affords neither Vitriol nor Sulphur, tho' it conſiſt only of thoſe. It's the Cauſe of Thunder, Lightning, Earthquakes, Meteors,* Ignis fatuus, &c. &c. &c. *for Time would fail me to recount all its Feats. It and* Lapis calcarius *or Limeſtone, are the only Stones, that ſince the Creation, have, are and will be generated to the End of Time. Its Waters purge, and yet it's the Nitrous that open the Belly; for tho' diſſolved, yet it exiſts not in the Waters, but yet it Purges us in them. As the Doctor was prejudiced againſt the Uſe of Mineral Waters, ſo we have Reaſon to fear he truſted too much to the injudicious Tryals of negligent ignorant Perſons; or that his Experiments were to ſupport ſome preimbibed favourite Hypotheſis,* viz. *either to magnify the Wonders of the Pyrites,*

Pyrites, or to expel the Exiſtence of Vitriol out of Mineral Waters, or to place Iron in the Calculus, *or to depretiate the Waters, and put Men out of conceit with ſo cheap, ſafe, palatable, and efficacious a Remedy; a Remedy contrived with infinite Art, of extenſive Uſe, and a Pledge of great Commiſeration and Kindneſs to the feeble, infirm human Race. I would neither be partial in their Favour, nor conceal their Efficacy, but ſpeak Truth, be juſt to the Great Donor, and the infirm ſickly Uſer. And allow me to affirm, that whoever attempts the Examination of Medicinal Springs for the ſupport of a received Opinion, whenever his Reaſon gets at Liberty, he will find himſelf deceived, Nature miſrepreſented, and Mens Judgments impoſed upon; for I am ſatisfied that the Defence of ſome darling Notion, Intereſt, falſe Compariſons, inconcluſive Arguments, improper Methods, injudicious Experiments, too great Credulity, and want of perſonal Diligence and Preſence, have hitherto been the chief Cauſes of the Miſrepreſentation of Mineral Waters. Every Enquirer ſhould be upon his Guard, and throw off Attachment or Prejudices in favour of a preconceived Opinion, and beware that he take not things upon Truſt, from the credulous ignorant and unexperienced; nor acquieſce in Philoſophical Speculations, without plain and undeniable Demonſtration, nor be carryed headlong with the generally received Opinions; let him act the Part of an Impartial Hiſtorian, regard Truth, attend to Nature and her Diſcoveries from ſimple, eaſy and uncontravertable Experiments; then, and not ſooner, he ſtands a fair Chance of ſucceeding to the great benefit of Mankind, and pleaſant Compenſation of his Labour. That Dr.* Liſter *has made but a ſlight Examination of ſeveral Waters, is evident from his Accounts of* Scarborough, *which he ſays, contains nothing beſides Limeſtone-Salt, Ocre and White-Limeſtone-powder, here it's Sea Salt is quite overlooked. He ſays* Long-Addingham, Broughton *and* Cricklee-Grounds *Waters are all Sulphurous, and contain only Marine Salt: now the Firſt of theſe never had any Sign of Sulphur in this World, being a very fine, light, ſmall Chalybeate Water; ten Gallons whereof will not afford a Grain of Salt, if I may be permitted to conclude from my Trials of it.* Broughton *contains chiefly Marine Salt, with a pretty deal of Nitre.* Cricklee-Grounds *Water, yields a great Quantity of both Nitre and Marine Salt; the firſt Cryſtalizes in* 10 *or* 12 *Days time, and the other afterwards. He ſays "Four Gallons "of* Buxton *Water afford a Scruple or two of Salt; without any Stone-"powder; but we ſhall find it otherwiſe; this Salt he will have to be moſtly Marine Salt, but this is an Error, as we ſhall ſee.* Malton *Water with him, contains only Limeſtone-Salt, and powder of Limeſtone, with ſome Plumoſe Allum; but had he laid aſide his favourite Hypotheſis, he would have found his Alum to be Vitriol. The Cryſtals of his fifth natural Salt, or*

Limeſtone Salt, which generates ſpontaneouſly both in the crude Limeſtone and old Lime Walls, and of all other foſſil Salts is the moſt plentiful, it's Cryſtals, he ſays, are long and ſlender, with four Parallelogram and ſomewhat unequal Sides in the middle; but of all the Nitre that I have obtained from a great many Waters, the Cryſtals had all ſix Sides, each two being equal and oppoſite, as repreſented in ſeveral of the Figures. I have ſeveral Times, unſucceſsfully attempted to procure Cryſtals from both crude and calcined Limeſtone; a very ſtrong Lixivium *I did obtain from old Lime out of a Chimney, but not one Cryſtal upon ten Weeks ſtanding, but it's ſtill in a fluid State, and intolerably thick and Salt. Come we now to our Author's Effects of Mineral Waters upon human Bodies. "The cold ſtinking ſalt Waters, the nitrous atramentous and nitro-atramentous, are all Lapideſcent;* [a] *the Warm Salt nitro-atramentous, and the cold ſulphur Waters, all excite violent Thirſt, Vomiting, burning Heat of the Stomach, a Diarrhœa often continuing ſeveral Months, naſty Eruptions of Puſtles over the whole Body. Cold nitrous Waters, wherein Limeſtone Nitre is moſtly immature, make the Body coſtive. Cold nitrous, or nitro-atramentous Springs where the Limeſtone Nitre is mature, leſs of the Stone and ſome little Ocre, or abortive Vitriol; theſe Waters occaſion a Vertigo, as in ſlight Drunkenneſs, a ſudden watery Looſeneſs, without Pain or Gripes, a ſmall or no Thirſt, a greater Appetite for a few Days, much red Sand in the Urine and ſometimes Stones, even in ſuch as never had Sand, Gravel, or Stone before, and ſparkling ſaline Particles in the Urine, and this often continues ſeveral Months after drinking the Waters. A ſharp poignant Pain in and about the Arms from the Sharpneſs and Acrimony of the Salts. And if they continue to drink the Waters too long, they frequently cauſe a Fever. The Quality of the Ingredients impregnating our Mineral Waters, is, in one Word Petrefaction; for both the Pyrites and Limeſtone being inconquerable by our Stomachs, and both being in their growing State are lapideſcent, for theſe are the only Stones that ſince the Creation do generate; they petrifie Animal, Mineral, and vegetable Bodies, and in this Senſe all Waters are Medicinal, but much more Mineral Waters,* &c." *Thus you ſee all Waters breed the Stone, and the more they diſpoſe animal Bodies to this, the more medicinal. Hence ſuch as petrify Birds, Beaſts, Plants, and Parts of Men are the moſt medicinal; and tho' impregnated but with few Principles, yet theſe are miſchievous enough: Nor have we reaſon to complain that nature has been niggardly in her Diſtribution, for had they contained more, probably they had been ſo much the more pernicious. Let ſuch as are liable then to the Jaundice, Stone,* &c. *look out for another potable than Water or any thing produced of it; and it's ſome Comfort that we have other Fluids beſide,* viz. *Air, Light,*

[a] Diſſertat. alter c. 2.

Light, and Mercury, chuſe your Tipple out of thoſe three, and be thankful, ſince Nature has poyſoned the fourth Fluid, Water. As for the Virtues of Mineral Waters, " *he would rather learn theſe from other People's Tattle,* " *than know them from his own Experience and Obſervation. All Authors* " *agree that theſe Waters are good in the Hippo, Cachexy, Scurvy, Stone,* " *Arthritic Pains, Worms and Sterility." But out of this ſmall Scantling he can only recommend them in the Hippo and Worms; he not only diſcards their Uſefulneſs in all the reſt, but reckons them highly miſchievous in the Stone; and ſtill more ſo in the Gout and Arthritic Pains.*

A third *Reaſon for undertaking the preſent Work is, that here we have many Mineral Waters which never have been tried at all, and yet are of great Repute, as* Croſt, Stenfield, Aſwarby, *&c. that may either be equally ſerviceable with thoſe already examined, or be more uſeful in particular Caſes, and when their Nature and Properties are found out, they may with little or no Expence contribute to the Health of the poorer Sort, whoſe Buſineſs and narrow Circumſtances will not allow them to travel to remoter Waters; and alſo be ready at Hand for the Benefit of the Rich, whoſe Weakneſs and Infirmities might render a long Journey troubleſome and dangerous.*

Fourthly, *Many of the Waters in Uſe have been ſo ſuperficially examined, that it's impoſſible to draw any certain Concluſion concerning their Contents, or what they are or are not; and therefore ſhould be more thoroughly ſearched and ſifted.* Buxton *for Inſtance, which tho' it has juſtly maintained it's Character theſe two thouſand Years, yet has there no Pains been taken to diſcover its impregnating Principles, except what* John Jones, *(a Welſhman, who lived ſome time at* Kings Meadow *near* Derby) *near two hundred Years ago; and a tranſient Viſit made it by Dr.* Liſter. Matlock *tho' much frequented of late Years, yet the World are Strangers to its Contents, tho' ſome would have us believe that its Virtues are exactly the ſame with thoſe of* Briſtol; *but offer neither Argument nor Experiment to ſupport their Opinion.*

Fifthly, *The Wranglings and Contentions of thoſe who have wrote on our medicinal Waters, would tempt one to think that they had not the Diſcovery of Truth ſo much at Heart, as the Gratification of a private Humour, or the Support of ſome favourite Hypotheſis,* &c. *Hence ſeveral of them have fantaſtically impregnated ſeveral Waters with Principles of their own Brain, and not thoſe of nature's Bounty; ſo peeviſh were they that placing a Word, nay, a ſyllable different from one another, would occaſion a Quarrel, that if one ſay they contain a nitro-aluminous Salt, another will blot many Sheets of Paper to have it an alumino-nitrous Water, and yet both be miſtaken. Never did this litigious Temper arrive at a greater and* *more ſcandalous Height among Gentlemen, than in the famous Controverſy about* Scarborough *Spaw, which at laſt was taken Notice of and reproved publickly by the Secretary of the Royal Society,* [a] " *who wiſhed and thought* " *it neceſſary to commit the further and new Examination of this Water,* " *and the Diſputants and their Writings, to a Conjunction of ſome amica-* " *ble unbyaſſed, able and diſcreet Perſons; and ſo for the good of Mankind,* " *regard to Truth, credit of the Spaw, Satisfaction of the learned, diſen-* " *gaging theſe partial, prejudiced, unbecoming, inveighing Parties. Thus* " *would a ſincere and impartial Examination tend to the Improvement* " *of Phyſiology, to the Relief of Man's Health, to the ſtocking of the Philo-* " *ſophical Magazine,* &c." *The Society had before given them a gentle Reprimand and Admonition,* [b] *ſaying,* " *if the Profeſſors of this Art,* " *would but lay aſide Animoſities, perſonal Reflections, and private Conſi-* " *derations, and withal acknowledge as they ought, that new and great* " *Diſcoveries might be made by careful Obſervations and Experiments,* " *they would eaſily agree and join together,* &c. *But this did not do.*

Sixthly, *Allowing however that former Examinations had been the beſt and moſt juſt, and the impregnating Principles moſt truly and exactly diſcovered and deſcribed, yet a Re-examination is nevertheleſs neceſſary, to know whether the ſame Springs retain the ſame Principles, in the ſame Degree and Proportion, or whether they are changed, diminiſhed, or totally loſt, and the Water returned to the State of meer ſimple Element. For we are aſſured from ſeveral very good Hands, that ſundry celebrated Waters have gradually ſunk in their Reputation. Several Waters I have examined, which formerly were of very great Note, and had done ſurprizing Cures, but are now out of Requeſt; nor could I find them differ at all from common Water.*

Seventhly, *Tho' we had a fair and judicious poſitive Hiſtory of Mineral Waters (which is in a great Meaſure wanting) yet ſhould we find our ſelves at a Loſs for a comparative Hiſtory of them; for tho' ſeveral Waters are impregnated with the ſame Minerals, yet ſome are richer, others poorer, and therefore leſs efficacious. Some have their Principles leſs mixt with other Ingredients, whereby they are wholeſomer and purer; ſome contain a larger Portion of mineral Spirit than others. Some are briſker and eaſier in their Operation than others. Some produce their Effects in a leſs Time and at a greater Diſtance; others in a longer time and only at the Spring head; ſome have their Parts more volatile, in others they are groſſer and more fixed. Theſe and a great many other Things render a Work of this Kind highly neceſſary, and eſpecially now, when Mineral Waters are in ſo great Reputation and ſo much frequented.*

Eighthly,

[a] Phil. Tranſ. N° 35.

[b] N° 49. p. 999.

Eighthly, *There are ſome Waters eſpecially noted in the Cure of particular Diſtempers, and did we know the impregnating Principles and Proportions of thoſe Waters, this might give ſome hint what kind of Medicines are moſt eligible in thoſe Diſeaſes, where the Waters cannot be got, or their Uſe is unſeaſonable.*

Laſtly, *Authors have often made every Water a Panacea or univerſal Remedy, whereby they might juſtly have rendered them ſuſpected of any Virtue or medicinal Quality; or they have raiſed horrid Emulations, Competition or Contention in the Minds of Men about them; ſome have over-valued one and under-valued another, as beſt ſuited the Writer's Deſign and Intereſt; but had they from clear Proof aſſigned the primary Virtues and Intentions of each, they could ſeldom have made the more noted Rivals. Indeed in many ſecondary Uſes, they and common Water are Rivals, as they are among themſelves. Theſe are the Reaſons of the Publication of this Work; I ſhould now give an Account of the Method I lay down for my ſelf, but a cloſe Attention to what I have already ſaid, will prevent both my ſelf and Reader that Trouble.*

But to all this ſome may ſtill object, that the Deſign is out of their Way, foreign to their Study, that they can be nothing bettered nor inſtructed by it; when they want a Courſe of Mineral Waters, they muſt have their Phyſician's Advice, and they are willing and better pleaſed to place an implicit Faith in both Parſon and Doctor than trouble themſelves, or be at any Expence about it; therefore it is not a Work for them. I anſwer, if your Bodies are exempted from human Infirmities and Diſeaſes, then it's out of your Way, and you are highly excuſable ſo far as relates to Health; but then we hope to entertain our Readers alſo with ſome Pieces of natural and experimental Hiſtory, the Examination of ſimple, and the Separation of compound Bodies; ſome Methods of diſcovering natural Bodies which lie hid in the Bowels of the Earth, ſome ſportings of Nature, &c. *And ſure theſe are out of no Man's Road that has either Taſte or Curioſity, or that has Pleaſure in the Works of the great Architect of Nature: But if your Bodies are liable to the ſame Accidents and Diſeaſes with the reſt of your Species, how can you come at a cheaper Account of your Cure in chronic Diſeaſes, and where is there a ſafer, more ſucceſsful and palatable Remedy? and have you no Pleaſure in giving Counſel to your poor Neighbours, Relations or Acquaintance? And as to adviſing with Phyſicians, I would by no Means have any to enterprize a Courſe of mineral Waters without his Advice: But is it not often the Caſe, that the Phyſician knows as little of the Mineral Waters at a great Diſtance, eſpecially if they are of leſs Note and Fame, as the Patient, and yet never the worſe Doctor for being* *ignorant of what he never had an Opportunity to know, or be informed of. And as to the Plea of implicit Faith, this will hold only ſo far as tallies with their Humours and Intereſt, and is but a wretched Shift when they want a good Argument, for notwithſtanding, both their good natured Parſon and Doctor will find themſelves hard put to it, to put off a Counterfeit on ſuch Gentlemen inſtead of a piece of Gold.*

INTRODUCTION.

1. BEFORE I proceed to the Examination of the Contents of Mineral Waters, it may not be amiſs to obviate two Objections which may be made.

Firſt, It's impoſſible, ſay ſome, that theſe Waters can be ſo Efficacious, of ſuch general Benefit, and work ſuch ſurprizing Cures as are pretended; for examine them as ſtrictly as you pleaſe, you can never find any Thing in them, beſides an inconſiderable volatile Part, perhaps of Sulphur and Vitriol, and a ſmall Scantling of fixt Salt, mixt with ſome kind of Earth; and all this we can have in a much larger Doſe, than by a Courſe of Medicinal Waters, perhaps of ſeveral Weeks or Months; and yet we know, it's odds it will not anſwer: Beſides, do we not ſee, out of the Crouds of Sick and Valetudinarians, that frequent theſe Springs, ſeveral return as bad as ever, who perhaps never after recover?

2 Anſwer, This Objection conſiſts of three different Parts, the firſt whereof is chiefly the Subject of the following Diſcourſe; the ſecond will be anſwered under the next Objection: So I ſhall only take Notice of the laſt here.

That theſe Waters are not equally ſerviceable to all muſt be owned: and alſo that ſeveral never are or can be cured; *i. e.* that ſome Diſtempers are of their own Nature incurable; and that Death is the common Fate of Mankind, cannot be denied; but that they are not of equal Benefit in all curable Diſeaſes, may be owing to theſe ſeveral Reaſons. Firſt, an improper Choice of the Waters. How many are diſappointed of their Expectation by reſorting to ineffectual and unſuitable Waters, neither knowing their Difference, nor the Cauſe of the Diſtemper? *E. gr.* Is a Man of a ſanguine Plethoric Conſtitution, either as to the Veſſels or Humours, and yet has he Ignorance or Boldneſs enough to venture on Courſe of ſuch Waters as are loaded with Sulphur and marine Salt, inſtead of ſuch as ſoften, cool, relax and lubricate: May not common Reaſon tell us that ſuch Waters as heat, rarify and encreaſe both the Blood's Motion and *Momentum*, are vaſtly miſchievous in ſuch a Caſe?

or is it one whoſe Blood is too grumous and thick, and its earthy Part predominant over the other Principles, and he flys to a Courſe of the ſtrong purging Waters, whoſe briſk Operation ſhall drain off the ſerous Parts of the Blood, thicken the Remainder, exaſperate the Diſtemper in all its Symptoms, render Circulation more Difficult; due Secretion and Excretion next to impoſſible? is this the Fault of the Water, or of him, who without Advice or Judgment has made ſuch a wretched Choice? had he repaired either to the briſk, ſpirituous, clear Chalybeates; or to the tepid Springs, which have little in them beſides a ſmall Degree of Heat, from the Marcaſitical Vapour mixt with the Water, he had found what he wanted and deſired. Is another under a Cachexy Dropſy, ſtubborn Jaundice, or *Leucophlegmatia*, and yet truſts his Recovery to the Uſe of the tepid Waters, and not to the Purging Chalybeates, or thoſe ſaturated with Sulphur and marine Salt? do ſome ſuffer much, and are endangered by a tedious emaciating *Diabetes*, and yet have Recourſe to the powerfulleſt light diuretic Chalybeates, and not to the Lime-Stone Waters. Has any one a Stiffneſs, Contraction or continual Convulſion in any Part or Limb, and at the ſame Time contents himſelf with a Courſe of the ſtrengthening and not of the warm relaxing Springs? will any wiſe Man under a partial or general Relaxation, Looſneſs, and want of Elaſticity in the Fibres and Muſcles, without groſs Obſtructions, or a Lentor of the Blood, expect Relief from the warm Baths alone, and not from the cold; chiefly when the hot have preceded: But Miſtakes of this Sort are too tedious to be pointed out; and it's very certain they all ariſe from our want of Acquaintance with our ſelves and the Nature and Contents of different Waters.

3. But, *Secondly*, Want of Succeſs may ariſe from an unſeaſonable Uſe of the Waters; as in, or after much Rain, when the Springs are weakened with freſh Waters; and at the ſame Time there is no poſſible Safety in uſing Exerciſe, which ought always, where the Perſon is able, to attend the Uſe of Mineral Waters; or in the Winter time, when Perſpiration is too ſmall, all the Streſs of Evacuation is laid upon the ſenſible out-lets, and a Ceſſation of neceſſary Exerciſe is an unavoidable Companion at the ſame Time. The Waters may alſo be ineffectual from either the Diſtemper, or its Cauſes, being miſtaken: It's very eaſy to take one Diſeaſe for another; Characteriſticks of each are ſo few, and little obſerved, and thoſe common; ſeveral Maladies are ſo many, it's not every one, nay, very few that are proper Judges.

4. *Thirdly*, The Inefficacy of the Waters may be occaſioned from an irregular Uſe of them, as, immediately to begin with a liberal Uſe of them, whether they be purgative or diuretic, when there may be abun-

dance of Obſtructions in either or both the firſt and ſecond out-lets of the Body, as indurated *Fæces*, or abundance of loading *Mucus* in the Inteſtines, which ſhould have been firſt carried off by a little Rhubarb, Manna, Lenitive Electuary, Cream of Tartar, *Epſom* or *Glauber's* Salt, or ſuch like gentle Laxative or Mucilage, Sand, Gravel, ſmall Stones, or ſome Conſtrictions in the urinary Paſſages, which required firſt to have been removed. If ſuch People receive Hurt from ſuch Waters; ſure no Man can juſtly charge them with it, but his own imprudent, or covetous Conduct: Or ſecondly, he Swallows down an unreaſonable Doſe at his firſt ſetting out, as five or ſix Quarts in a Morning, and without obſerving a due Diſtance of Time, whereby the Water preſently reaches the urinary Paſſages if open; but they not being gradually dilated, in Proportion to the ſucceeding Deluge, will ſtrain it off but ſparingly at firſt; hence the Veſſels of the Body are filled, the Body ſoon appears as in a Dropſy, heavy, ſluggiſh and diſordered: And if this Courſe be purſued four or five Days ſucceſſively, he muſt be ſick to ſuch a Degree as will convince him of his Miſtake; or if he pours down this Doſe upon a Stomach whoſe Tone is relaxed, and cannot therefore, ſend it off in any due time, it muſt be palled to the laſt Degree, the Perſon faint ſickiſh and much out of order; or if he ſwallow this Quantity the firſt Morning in large Obſtructions, if the Waters get into and mix with the Blood, it's ſuddenly diluted, the Veſſels quickly diſtended, their Spring proportionably diminiſhed, the obſtructing Matter driven further on, hence the Obſtructions are rivetted. Here appears the Neceſſity and Skill of a Phyſician, to judge the Degree of thoſe Obſtructions, and ſuitably to Proportion the ſafe Doſe of the Water to them. A little Oil will make the Fire flame more and burn the brighter, but too much will quite extinguiſh it. Or thirdly, they may have weakened Nature before they begin, with ſwallowing down Bolus's, Draughts, Pills, *&c.* or too ſtrong Purgatives, which is as great an Error as a Man can poſſibly fall into; for hereby the Stomach is palled, Digeſtion weakened, the Body and all its Actions unneceſſarily enfeebled and that to a great Diſadvantage, for in Truth, very little Medicine is required along with the Uſe of thoſe Waters. A Lenitive when the Body is coſtive; or an Opiate or Balſamic to relax, when there is an Aſtriction on the renal Glands, or Ureters, or ſaline pungent Draughts, when they are reſty and do not anſwer; or a ſmall eaſy Emetick, when the Stomach is loaded, will anſwer a Variety of Indications. Fourthly, when they drink their Water in ſo ſcanty a Manner as though it were, or might be, Poyſon, or as if they were afraid it ſhould be of Service to them, as half a Pint or a Pint a Day; tho' I own this is the ſafer Way to begin, eſpecially when they are doubtful whether the Water ſuits their Caſe or not, but it would be next to a Miracle, ſhould this ſmall Quantity anſwer any valuable Deſign. Fifthly, others are of ſo ſleepy or lazy a Conſtitution that they cannot, or will not riſe ſo early to drink the Waters as to have them carried off before Dinner, but refer them to the Afternoon; when the Stomach and Bowels are lined with Food, which muſt lie for a time between the Water and the Mouths of the Lacteals, and the Meat and Medicine, muſt be thrown into the Blood together; and to add to the Matter, the Stomach in time of Digeſtion muſt have a load of cold Water thrown upon it, or to prevent the Miſchief of that, they muſt content themſelves with ſo ſmall a Quantity as will be of no Service to them, conſequently they muſt either do themſelves hurt, or loſe the Benefit they might have received. Sixthly, others meaſure their Doſe of all Waters by the ſame Gauge; thus they will drink no more of *Buxton* and *Matlock*, than they do of *Harragate* Sulphur Water, tho' the laſt operates powerfully and quickly both by Stool and Urine, and ſo where the Paſſages are not plugged up, goes off eaſily and ſoon; the former neither being impregnated with ſo much, nor ſo ſtimulating a Salt; as to irritate and force its Way, work rather by their adding to the Bulk of and thinning the Blood both by their Vehicle and Spirit, and relaxing the Veſſels. Seventhly, others, tho' able, are yet ſo lazy, that they will not be at the Pains to walk to the Spring, to drink their Doſe, but muſt have them brought Home, and perhaps let them ſtand by in an open Veſſel expoſed to the Air, till their volatile Parts, wherein lay their greateſt Virtue, is gone off; and the fixt Parts are often inconſiderable; thus *Scarborough* Water tho' largely impregnated with a fixt Salt, yet weighs lighter, when juſt taken out of the Well, than when it is carried into the Town, and has ſtood two or three Hours. *Buxton* Water which contains little beſide its Spirit, is much lighter at the Spring Head than when it is cold. To what is this encreaſe of Weight owing, but to the Exhalation of the Spirit, its Rarefaction going off, and contraction of the Air ſucceeding? When this Spirit is gone, moſt Waters load the Stomach, occaſion Flatulency and Obſtructions in the Bowels; and the more the Water is loaded with mineral Parts, the worſe it is: Hence *Buxton* Waters of all others in this Country go off the Stomach ſooneſt, and with moſt Eaſe, when it has loſt its Spirit. Eighthly, ſome again, who are able, yet will not uſe Exerciſe with their Waters; but we know that ſuch is the preſent make and Conſtitution of human Bodies, that even when healthy, they cannot long ſubſiſt in that State without Exerciſe; much leſs can we expect to recover from Chronic Diſeaſes without it, eſpecially when we are daily taking in two or three Quarts of Water or more, which ſhould not be ſuffered to reſt in the Body; and this Conſequence is not to be avoided without Exerciſe.

5. *Fourthly*, An irregular Diet in Meats and Drinks may prevent all the good Effect of Mineral Waters. And 1. Can a Man imagine any Thing more irrational, than for one in a Hectic or Scorbutic Habit of the Blood, to indulge his Palate, with eating aromatic, pungent, ſaline Pickles, or Sauces to his Meat, as Pepper, Muſtard, Horſe-Radiſh, Onions, *&c.* 2. For another in an Aſthma from a ſtuffing and loading of the Lungs with viſcidities to eat, Muſhroons, Cheeſe, *&c.* or 3. For thoſe in a Cachexy, Dropſy or Foulneſs of the Glands, to eat Fiſh, Bacon, Pork, leguminous Foods, *&c.* 4. Another in a Hypochondriaciſm, will eat nothing but drying, earthy, and thickening Things, as ſalt Meat dryed in the Smoak; and drink reſtringent or glutinous Liquors. 5. Some whoſe Veſſels are already half ſhorn away, and therefore have a pale meager Look, dropſical Legs, and no Appetite, yet will be ſo miſchievous to themſelves as to drink nothing but white Wine. 6. Others again complain of a Coldneſs of their Stomach and Blood, to warm which, nothing reliſhes with them but Drams of Brandy or Rum every now and then, not conſidering that Liquid Fire as well as culinary, dries and parches the Blood, and ſhrivels up the Solids, when Exerciſe alone ſuited to their Condition would do infinitely better; or if there is a real ſizeineſs of the Fluids, and a Relaxation of the Solids, in the Declenſion of Life eſpecially, a little warming aromatic Tincture, Infuſion, Powder or Pills, taken in the firſt Glaſs of Water, would anſwer their Deſign much better. But there ſhould be a very ſufficient Reaſon for allowing even this. 7. Some cannot eat at Dinner, and therefore muſt be indulged a Fleſh Supper, this is eaſily remedied, would not People be too ready to gratify a depraved Inclination; cannot you riſe betime in a Morning, ride out after your Waters, and in a few Days, if you can have Patience, I will anſwer for it your natural Appetite to Dinner will be ſharpened, if you keep but good Hours at Night. But let me aſk you, do you go to Bed preſently after Supper, or do you ſit up till it is digeſted? If the firſt, is not Sleep a ſtate of general Relaxation of all the Muſcles of the Body for two Reaſons, 1. To relieve it from the ſuperfluous load of hurtful Fluids in the Body. 2. Place being given to a Succeſſion of freſh invigorating animal Juices or Spirits from the Brain, both to ſupply the leſs of the preceding Days Expence, and lay in a new Stock for the enſuing? Do they, I ſay, want Reſtoration and Invigoration daily? And does the Stomach, which tho' a thin Membrane, and yet is the Kitchen and Laboratory for the whole Body, want none? Muſt it be

continually kept upon Action in digeſting your Water one whiſe, and your Meat and drink another, and ſtill be kept on to hard Work at Night; when the other Parts of the Body are relaxed, laid by to reſt and ſupplied with freſh Recruits? And do you expect that it ſhall then diſcharge its Office to the beſt Advantage? That the Chyle ſhall be prepared in the healthieſt Manner? Monſtrous! if it be ſaid that they ſit up till the greateſt Part of Digeſtion is over, I aſk how long this will keep them up, till twelve or one a Clock, will they then in the firſt Place after this have had Sleep enough, perſpired enough, and be ready to riſe at ſix of the Clock to drink the Water? Shall the Chyle of a Supper of ſuch hard Digeſtion be duly prepared, have all its nutritive Parts ſeparated from it aſſigned to the proper Uſes, and its Recrements ſtrained off in this given Time, conſidering the Diminution of Action, from the Relaxation of the Muſcles, Fibres and Veſſels in Sleep, and ſo the Body prepared a freſh for the Waters? No ſatisfactory Anſwer can be given to theſe Queſtions. I add further, you came *Valetudinarians*, and are in the beſt Way imaginable to return ſuch, in Spite of the Waters, to which you ſet your ſelf at Defiance by theſe Courſes, which proclaim you greater lovers of Luxury than of Health, and beg to be excuſed from parting ſo eaſily and ſoon with your Indiſpoſition, which begets the Compaſſion of your Relations and Neighbours: Give me leave to think, at this Rate, you are not only diſordered in your Body, but in your Intellectuals alſo. One would be almoſt tempted to believe, you came not to ſeek Help, but pick a Quarrel with and ſpread a bad Report of the Waters, and in them of the moſt likely natural Helps.

6. But *Fifthly*, A Meat Supper brings to my Mind, that many are no leſs negligent in keeping ſeaſonable Hours, in going to Bed and riſing: Is it not the Cuſtom of ſome to invert the Courſe of Nature, by turning Night into Day, and Day into Night, ſpending the Firſt (if they can poſſibly crawl about) in Revelling and Wantonneſs. Are you in Health or not? if you are, is it your fear that it will never fail, and therefore to get rid of it, you ſpend and throw it away in a moſt Profuſe and Indiſcreet manner; and not contented to injure your ſelves only, but you diſturb thoſe that come not there for Pleaſure but Neceſſity, and therefore would be glad of a very different Courſe? Is this Humane, to make the Life of others, (the Sick and Afflicted eſpecially,) miſerable, their Medicines not only uſeleſs but hurtful, and ſo do all you can to ſhorten their Days? do you labour under any Diſtemper your ſelves? is this the Way to get rid of it? are not Diſeaſes the cauſe of Death? and do you labour under that which has been the Occaſion of the Diſſolution of Thouſands? and are ye willing and ready to go?

then why came you here to diſturb ſuch as would be glad to find Health ? I own Serenity of Mind, Briſkneſs and Vivacity of Temper, are moſt ſuitable to a Courſe of theſe Waters, but by all means let it be ſeaſonable; and with theſe Limitations its highly commendable, and contributes to carry off the Waters.

7. *Sixthly*, Take care to keep your unreaſonable and ungoverned Paſſions within bounds: It's enough to prevent the Succeſs of your Courſe, and exaſperate your Illneſs, and all its Symptoms, if ye do not; for we ſee even in a State of Health, how hurtful they are. Have not we many Hiſtories, how they have occaſioned Palſies, Apoplexies, Fevers, Tremors, and other Nervous and fatal Diſtempers ? how much more miſchievous muſt they be to Valetudinarians and deſtructive of the Benefit of Medicinal Waters ?

8. Therefore that many return from theſe Waters as bad, or worſe than ever, we allow, ſince we do not expect Impoſſibilities from them, tho' we often have ſeen them work unexpected and aſtoniſhing Cures. But when through Age, Fury, or ungoverned Paſſions, or ſuch Meats and Drinks, and other injudicious Uſe of the Non-naturals as have dried up the Fibres, and ſo contracted and ſhrivelled up the Springs of the Human Machine, as they are no more to be made flexible; or where the Obſtructions are ſo great, the Veſſels ſo dilated and weakened, the impacting Matter ſo thick, as to be for ever incapable of Attenuation and Diſſolution, and ſo the Veſſels never to have their Paſſages opened, nor a freſh vital Stream to paſs through them any more; or where a ſpontaneous Glutinouſneſs of the Juices, together with an irremoveable Sluggiſhneſs of the Veſſels, great Obſtructions, and general or particular Tumours or fullneſs of the Glands happen; or where from the Acrimony of the Juices, Abraſion and inſuperable Debility of their containing Tubes, mortal Hemorrhages are poured out into any of the Ventricles: Or where the direct Corroſiveneſs of the Blood, Mortifications, eſpecially in any of the principal Parts ſieze: Or where from deep and long Inflammations taking up much Space, filling, dilating, and breaking ſeveral Veſſels, cauſing Suppuration and Putrefactions: In theſe, I ſay, and many other like Caſes, what can Phyſick, Mineral Waters, or Phyſicians do ? Is it expected they ſhould create and enliven new Bodies ? or make and adapt ſome particular Members to the old ? for no leſs can do here, the old being irreparable, and not long Tenantable; hence we ſee the Ridiculouſneſs of expecting conſtant Succeſs from the moſt celebrated and ſpecific Remedies in all Caſes. The Bark will not always do in all Intermittents and periodical Diſtempers, nor Steel in all Obſtructions; nor Mercury in every *Lues*, nor Rhubarb and Ipocacuana

in all Diarrhæas and Dyſenteries; for theſe Diſeaſes, ſeveral of them ariſing from contrary Cauſes, are accompanied with different Symptoms and Indications in ſundry Conſtitutions, and will always make the advantageous Uſe of thoſe Remedies called Specifics, whether Waters or Medicines, the Talent of the ſtudious attentive Phyſician. In difficult and complicated Caſes, eſpecially from theſe few, and many like Inſtances we may ſee the unavoidable Neceſſity of paying the Debt of Nature ſooner or later, by ſome incurable Diſeaſe or Accident, maugre all Mineral Waters and Medicines; and therefore the contempt of theſe Waters, becauſe they have not always the deſired Effect, is not a whit more unreaſonable, than if Perſons would ſwear againſt both moderate and exceſſive Uſe of Meat and Cloaths, becauſe all that ever uſed them before the preſent Age, are dead, which is making the neceſſary Supports of Life the certain Cauſe of Death.

9. Objection the ſecond, But ſay others, That Medicinal Waters are poſſeſt of ſuch Virtues, and perform ſuch Cures, is neither to be diſputed nor denied; but that your few inconſiderable ſuggeſted Principles of a Spirit, Sulphur, Vitriol, fixt Salt and Earth, ſhould of themſelves in ſo ſmall a Proportion, produce thoſe ſurprizing Effects, we deny abſolutely; therefore the Inveſtigation of Mineral Waters is to no purpoſe, for it's impoſſible to find out and produce thoſe Materials in them, that work theſe notable Cures.

10. Anſwer, I yield you are ſo far in the right, that theſe Contents conſidered ſimply, and excluſively of other Helps, will never anſwer our Character, nor the Patient's Expectation; and a neglect or forgetfulneſs of thoſe other Aids has given riſe to this Miſtake, that becauſe Thouſands yearly find thoſe Waters of the greateſt Benefit, and we by the ſtricteſt ſearch can extract but few Principles, and in ſuch ſmall Proportions, as of themſelves can never reſtore ſuch Multitudes; nay, generally the moſt efficacious Waters have the leaſt Contents, therefore, ſay they, we have not, nor cannot find out, what theſe moſt noble and ſanative Principles are; but if theſe are not ſo certainly to be found, yet their Adjutors and Aſſiſtants, ſuch as follow, ſeem to be out of all Diſpute.

11. *Firſt*, The ſtrict Regularity, and temperate diſcreet Uſe of the Non-naturals, that is, or ought to be regarded on this Occaſion: If Intemperance, or any indiſcreet Uſe of thoſe, is indulged, during a Courſe of Medicinal Waters, they and all other Helps will be but of little Service. What can a Glutton, who is ſtill laying heavy Loads upon the Stomach, wearing out the Tone of it, and the other Inſtruments of Chylification, more and more vitiating the Chyle,

filling the Veſſels with thick, crude, and indigeſted Fluids, daily laying and rivetting greater Obſtructions in the ſmall Veſſels, indiſpoſing the Blood for parting with its nutritive animal Juices, or rendering them unhealthy, and unfit for thoſe purpoſes, daily hoarding up new and certain Cauſes of Diſeaſes and Death; I ſay, what Succeſs can ſuch expect from a Courſe of Mineral Waters? Or what great things has he to expect, who, tho' he eat moderately, yet eats either unſeaſonable or unſuitable Food? as one in a Dropſy, yet will eat nothing but cooling, inſipid, mucilaginous Foods, and drink Ale. Another in a Jaundice, yet nothing pleaſes his Palate, but fleſh Meat and Claret; a third in a Scurvy, Leproſy, or other cutaneous Diſeaſe, yet hates a vegetable Diet, or will needs prefer the pungent, ſaline Antiſcorbutics. A fourth under great and obſtinate Obſtructions, or chronic Hyppo, yet feeds chiefly on thickening, hardening, and drying Meats; another has a Hectic, with a vomiting or ſpitting of Blood, yet loves nothing but ſuch things as encreaſe both the Blood's Momentum and Velocity, *&c.* Or what has the Tipler or Drunkard to expect in Reaſon, whilſt he is daily adding freſh Fuel to the Flame of his Diſtemper? what he contracted by his Intemperance, he is ſtill increaſing by the ſame Meaſure, or if he is not exceſſive in Quantity, yet is he indiſcreet as to the Quality, gratifying Taſte and preferring only ſuch Liquors as are perhaps directly oppoſite to all the Indications of Cure and his preſent Courſe. *E. gr.* One in a Diabetes muſt have white Wine; or in a Cachexy, Ale; or in the Stone and Gravel, Claret; or a gouty aged Perſon drinks only Water; or one who has worn out his Conſtitution with Drams, yet keeps to the fiery Vehicle, *&c.* or a laſcivious Wretch, who has weakened or deſtroyed the Spring and Strength of his Fibres and Solids, yet cannot forſake the Cauſe; ſhall he that has relaxed his Solids by Luxury, Effeminacy and Idleneſs, and ſtill follows the ſame vitious or indolent Courſe, can he expect to reap the ſame Benefit from thoſe Waters, as he that is regular and uſes Exerciſe? Or ſhall he that has ſtiffened and hardened his Solids by much Exerciſe and hard Labour, think they ſhall be relaxed again, in a purſuit of the ſame Courſe? ſhall a bad Air ſpoil a good Conſtitution, and will he not look out for Waters ſituated in a better? but theſe laſt come rather under the Name of Indiſcretion, as the reſt did under the Head of Intemperance. O! Temperance! thou Support and attendant of the other Vertues! Thou Preſerver and reſtorer of Health, and Protracter of Life! thou Maintainer of the Dignity and Liberty of rational Beings, from the wretched inhuman Slavery of Senſuality, Taſte, Cuſtom and Examples! thou Brightner of the Underſtanding and Memory! thou Sweetner of Life and all its Comforts! thou Companion of Reaſon, and Guard of the Paſſions! thou bountiful Rewarder of thy Admirers and Followers! how do thine Excellencies extort the unwilling Commendation of thine Enemies! and with what rapturous Pleaſure can thy Friends raiſe up a Panegyrick in thy Praiſe!

12. *Secondly*, That moderate, ſuitable and ſeaſonable Exerciſe is not only a great Preſervative, but alſo Reſtorative of Health to the Valetudinary, is not only conſiſtent with their own Experience, but obvious to all ſuch as conſider a human Body, as a Congeries of Solids and Fluids; which, tho' its Contexture be very tender, yet it improves by Exerciſe, and by Motion and Agitation becomes ſtronger, healthier and more durable. The Aſſiſtance of a general external Motion being neceſſary to be added to the internal, for the better carrying on a regular Circulation, that immediate Cauſe of Life. A Diſcreet Uſe of Exerciſe has the greateſt Power over the whole Body, and is productive of wonderful Effects in many Caſes, where things of ſeemingly greater Power have failed; for it reſtores the Tone of the weakened and relaxed Fibres, invigorates, ſtiffens and makes them more elaſtic, agile, and ſtrong; firſt by preventing the Collection and Adheſion of *Mucus* or *Size* on the internal Surface of the relaxed Veſſels. Secondly by agitating diſtending and dilating the Nerves, capacitating them for the Reception of a larger Quantity, and a compacter Appoſition of new nutritive Matter, daily carried into and diſpoſed of, in their imperceptible Cavities, which adds Strength and Springineſs to the whole nervous Syſtem. Thirdly, by attenuating, mixing, digeſting and ſeparating the Fluids, fitting them for a ſmooth and eaſy Courſe, along the fine Tubes of the Brain; hence plenty of well-elaborated animal Juices, for repairing the Loſs and plentifully nouriſhing the Fibres; and a freſh Stock of Proviſion for the next Expences. On the contrary, Idleneſs and a ſedentary Life, relax the Solids, diminiſh that muſcular Force and Action, whereby the circulating Juices are prepared to paſs fully and freely, the natural and neceſſary Secretions of the whole Body, and each ſecreting *Viſcus* is ſupplied with a due Quantity of Liquor for its natural Uſe; for the moſt nutritious Parts of the Blood ſeem only to conſiſt of the fineſt earthy Parts of our Food, and a moſt ſubtile Oyl; the firſt make up the ſolid and conſtituent Parts of the Body, the laſt is a Cement for the Coheſion of the Particles of the other. Therefore ſuch as live much on ſimple terreſtrious Food, and content themſelves with plain aqueous Potables, have the ſtrongeſt and healthieſt Bodies, containing feweſt bulky, relaxing and ſuperfluous Juices. If the Blood is not ſo fluid and ſubtile, that its fine Earth and delicate Oyl, may ſafely and eaſily paſs the ſmalleſt capillary Veſſels in a due time, it's impoſ-

ſible the Solids ſhould be nouriſhed and vigorous: But the Body muſt either pine away, as when the Mouths of the Lacteals or their Veſſels are furred up, thro' Indolence and want of Exerciſe, or the Fibres from the Redundancy of Humidities muſt be relaxed and weakened, through the Groſſneſs of the Chyle and Blood, Diminution of due Evacuations, and Laxneſs of the Solids from Idleneſs and want of Motion; the neglect whereof is much more Injurious to the Valetudinary; ſeeing Indolence unbends, and in ſome Meaſure diſſolves the nervous Syſtem, and produces ſuch Diſeaſees as are the Effect of a lax and weak Fibre, which are of dangerous Conſequence and ſeldom or never cured without Exerciſe; which as it gives the Body a moſt delightful Agitation and Senſation, ſo it contributes much to the frequent Preſſure and Aſſiſtance of the Muſcles to promote Circulation, Digeſtion, Mixture, Attenuation, and Secretion of the ſundry Parts of the Blood, and prepare it for the extream Fineneſs of the inviſible and delicate Veſſels and Meanders of the Brain, where the nervous Juice is ſtrained off. Exerciſe has alſo the Preference of all Medicines in this Reſpect, that as the laſt is generally given to promote and encreaſe ſome one Secretion at a time, and it's odds, but whilſt it's doing that, it diminiſhes all the reſt; but the firſt, at the ſame time promotes all the natural and neceſſary Evacuations, as well as diminiſhes the ſuperfluous and hurtful; cauſes the Secretions and Diſcharge of thoſe excrementitious Humours, the Attenuation of the Groſs, as well as a ſeaſonable and compacter Attachment of the nutritive Parts to the Sides of the decayed Veſſels, and thus gradually reſtores the due Conſiſtence and Mixture of the Fluids, and their regular Circulation, Diſtribution and Secretion; and removes the weakened and relaxed State of the Fibres, and raiſes and ſtrengthens their Tenſion. Seeing then the Advantages of Exerciſe are ſo great, it's very properly and neceſſarily annexed to a Courſe of medicinal Waters, and may deſervedly be eſteemed one of the noble Ingredients of that valuable Medicine, and ſhould no more be neglected than the Waters themſelves; which it ſends into all, even the moſt remote Parts of the Body; promotes their thorough Operation, haſtens and facilitates their Diſcharge, that they lie not in the Body. But *Fuller's Gymnaſtics* clear this Point fully.

13. A third Help is the Relaxation or Diverſion of the Mind, from its Intentneſs on its ordinary Buſineſs and Study. Doubtleſs where there is an immoderate Waſte of animal Spirits by ſome Organs, the other Parts of the Body muſt loſe of their due Proportion, and be thereby Sufferers, and have their Strength and Action impaired; eſpecially, when this deep Attention is accompanied with Diminution or Interruption of

due and neceſſary Reſt, with Intenſeneſs of Thought, decreaſe of Appetite and Digeſtions, neglect of Exerciſe, *&c.* For ſuch a Temper of Mind is much more injurious to Health and Strength, than bodily Labour; for in the laſt, the nervous Juice is ſpent, where it ought chiefly to be uſed, on the Muſcles of Action, whereby the Parts have the Spring and Force of their Fibres preſerved and encreaſed, ſo as Digeſtion, Secretion and Evacuations are, in a temperate Perſon, all duely and regularly performed, the Body's waſte is ſpeedily and fully repaired, Nature's Ballance is kept up, Health and Life are prolonged. But where the Mind is always at work, and contriving, ſolicitouſly ſearching after ſomewhat it wants, the far greateſt Share of the animal Spirits are ſpent upon the Organs of the internal Senſes, whereby the Inſtruments of Action are deprived of their due ſhare, and laid by as uſeleſs; their Springs fall back and decay; Digeſtion is performed ſlowly and imperfectly; Secretions are marr'd and vitiated, from a Want of the Blood's due Attenuation and Mixture; Evacuations, eſpecially Perſpiration is diminiſhed, becauſe of the Blood's Coheſion, Groſſneſs and Sizineſs. This gives us the true Reaſon why immoderate and indefatigable Studies diſpoſe Perſons to the Hippo, and windy Diſtempers, Indigeſtion, Diſorders of the *Viſcera* of the lower Belly, ſlow Headaches, Conſumptions, extravagant Fancies, *&c.* And why a cloſe Purſuit of this Method often makes them more ſickly and ſhort lived than Mechanicks.

This alſo indicates why it's highly injurious for a Man to employ one Part of his Time in hard Labour, and his ſpare Hours in intenſe Thought or Study. For when the Inſtruments of voluntary Motion ceaſe, and he ſhould reſt and ſupply his former waſte, he preſently exhauſts the remaining Spirits, or wearies out the Organs of his intellectual Faculties. On the contrary, how indiſcreet it would be for the cloſe ſtudent to employ his vacant Hours in violent Labour at an unſeaſonable Time, eſpecially, inſtead of refreſhing himſelf with ſome pleaſing Diverſion and Recreation; which might promote and enliven his ſlow Circulation and invigorate muſcular Action and Preſſure, without Expence of Spirits; and might attenuate and diſpoſe the Juices for a more copious ſupply of nervous Juice, ſuch as Riding, Billiards, Bowls, *&c.* Hence we have the Reaſon alſo, why the ſtudious have generally weaker Bodies, unable to bear ſo much Fatigue, Hardſhips, and Toyl, as the Labourer. For the firſt ſpends his Spirits in conſidering, brooding over, methodizing, and fixing ſome Ideas; the laſt upon voluntary and external Action, or the bodily Organs: Since then too cloſe Application of the Mind either in literary Studies, in anxious Purſuits of the World, Indulgence of any of the Paſſions, *&c.* do thus impoveriſh and rob the Body of its animal Spirits; it neceſſarily follows that there muſt be an Unbending and Diverſion of the Mind attending the Uſe of Mineral Waters, as well as other Medicines.

14. The *fourth* Aſſiſtant, is the Vehicle itſelf, wherein the Contents of Mineral Waters are brought to us, *viz.* cômmon Water; the beſt whereof has the moſt porous or ſpongy Body; admits or emits Air or Heat ſooneſt into, or from its Interſtices; therefore it heats and cools ſooneſt, and has the leaſt Mixture of extraneous Bodies; hence it's the cleareſt, and contains the leaſt adventitious compoſition of ſaline, vegetable Mineral, or earthy Parts to alter its reliſh, therefore it's the ſweeteſt, or moſt inſipid. Its Gravity is not encreaſed from thoſe foreign Ingredients, therefore it's of all others the lighteſt and bears Soap, mixes or boiles with Milk, waſhes, brews, and ſerves domeſtick Purpoſes the beſt, being ſofteſt; for if it's rough, harſh, and hard, that is, if it's loaded with ſtony and ſaline Particles, it's improper for thoſe Uſes. But rain Water of all others being freeſt from thoſe Mixtures muſt anſwer theſe Purpoſes to the greateſt Perfection. Such Water alſo as keeps longeſt uncorrupted and is freeſt from Impurities, ſparkles, is briſk and affords moſt Bubbles on pouring out into a Glaſs or Cup, is to be preferred. Next to rain Water, is ſpring Water, eſpecially if it riſes out of a fine earthy aſcending Ground, and runs upon a pure Gravel or Clay. River Water is next to this. Diſſolved Ice and Snow Water, and alſo all level and drain Waters are by general conſent rejected; the firſt becauſe their Texture is broken and their ſpirituous Part gone; the laſt, becauſe they take up and carry along with them Particles of Foſſils, Minerals, Earths, Stones, *&c.* And though Rocks or Beds of Chalk may ſeem to ſoften and abſorb the Aſperities in Water, and thereby better it, yet in Reality they make it harder, heavier, and more unwholeſome, by ſtuffing it with an earthy, chalky Matter; which makes it heavier on the Stomach, and go off more ſlowly; for theſe earthy Particles often ſtop and generate Obſtructions in the extream Veſſels. Stagnant Waters are by all acknowledged to be bad, becauſe they have loſt their moſt ſubtile and uſeful Parts; and in Room thereof have imbibed earthy muddy unctous or other foreign Subſtances, are become groſs, often fœtid, and not unfrequently cauſe Obſtructions in the ſmall delicate Veſſels of the Body, whence many Diſeaſes proceed. Neither are Well or Pit Waters to be commended, as approaching too near a ſtagnant State.

As to the Properties of Water, it conſiſts of exceeding ſmall Particles, that it may paſs the inconceivable ſmall Veſſels of Inſects, Animals and Vegetables, whoſe Food and Nouriſhment are conveyed to them in this Vehicle; and all Nutrition is made in the ſmall Veſſels, and the Growth and Augmentation of Animals and Vegetables is made at the Extremities of thoſe Veſſels, and we are certain that the ſmalleſt Bodies of Inſects diſcoverable in Air or Water by the fineſt Microſcopes, are conſtituted of Myriads of Veſſels; all which have their Fluids; the Baſis whereof moſt likely is Water; and probably the Diſcovery of theſe Veſſels bid an eternal Defiance to human Art. Other Inſects doubtleſs there are, which are almoſt inviſible, theſe have their Parts and numberleſs Veſſels, and Water ſtill is that Vehicle which muſt carry Nouriſhment, into thoſe incomprehenſible Tubes; how inconceivably ſmall then muſt the Particles of Water be? and how abſolutely neceſſary it ſhould be ſo? but as they are ſmall, ſo are they of a round and ſpherical Figure, leſt they ſhould touch in more Points than one; for had they touched in ſundry Points, their Coheſion had been too great for the delicate Tubes of Animals, but eſpecially vegetable Bodies, to have been kept in Motion; for as Nutrition and Augmentation happen in the ſmalleſt Veſſels; ſo do Obſtructions chiefly fall out there, from the Languidneſs of the Motion, Weakneſs of the Veſſels, Groſſneſs, or Coheſion of the Contents, which if conſiſting of Particles with plain Surfaces, their Coheſion would be vaſtly greater than their Gravity; and therefore for ever immoveable in the ſmalleſt Veſſels of the Inſects and Vegetables. The Particles of Water are alſo ſmooth, whereby they ſlide one upon another with greater Eaſe and Readineſs; are ſuſceptible of the leaſt imaginary outward Force, to put them in Motion, both for vegetable and animal Nutrition. But tho' they are round and ſmooth, yet are they liable to the Laws of Gravitation and Attraction, the firſt whereof exceeds the laſt. The ſmallneſs of its Particles the Roundneſs and Smoothneſs of it's Figure, is the Cauſe, that any collected Body of it is porous, *i. e.* has large Interſtices, whereby it's capable of receiving and containing near thirty nine Parts of Air to one of Water; whereby it's adapted to Vegetation and animal Life, and for the Reception of the Rays of Light through or betwixt its Parts. But theſe Particles of Water are very hard withal, hence they retain a Renitency and Incompreſſibility, when the Air is exhauſted; from which two Properties it is, that the Veſſels on the Surface of our Bodies ſuſtain the prodigious Preſſure of the external Atmoſphere, for had Water been compreſſible by an external Force, our Veſſels next Moment after our Birth, muſt have had their Sides ſqueezed together; and all Circulation ſtop'd at once, or had the Particles of Water been of unequal Figures, Magnitudes, or Hardneſs, Obſtructions would have happened every Moment in the ſmall Veſſels of Inſects and animals.

Upon theſe Properties of Water depend its wonderful beneficial Effects on animal Bodies; which are ſo conſtituted as to bear a Reſemblance in their Particles to one another; for the Parts of the Blood are alſo ſpherical, attractive, ſmooth and ſubject to the Laws of Gravitation: Hereby Water mixt with the Blood affects the Solids, removing their Reſiſtance, opening their Canals, rendering them flexible that the other Parts of the Blood may have free courſe. It acts upon the Fluids, by diluting and mixing their Parts, preventing or diſentangling their Coheſions, and *Moleculæ*, which might be the Occaſion of Obſtructions in the ſmall Veſſels, it ſheaths, diſſolves, and breaks the acrid ſaline Parts of the Blood, and ſo promotes and haſtens their Diſcharge out of the Body; it fuſes the thick viſcid ſizy Parts, and yet keeps up their due Magnitude and Tendency to one another; it recovers the natural Reſiſtance of the Veſſels, and takes off the Conſtriction of the Fibres. Water is an Alterative, being the beſt diluter or thinner of the Blood; the greateſt Relaxer, when drank warm, and yet a Conſtrictor taken cold; and as it's a Diluter and Diſſolver, ſo it is Aperient, and Attenuator; as it diſſipates coagulated and ſtagnant Humours in the Veſſels, it's a Diſcuſſive, and by encreaſing the Blood's Quantity and Motion, forwarding Secretions, haſtening regularly the Evacuations, ſo as the uſeleſs ſuperfluous Parts being carried off, the Globules come nearer to contact with one another; in theſe Reſpects it's an *Incraſſator*, it is a Detergent and Mundifier, by dividing, breaking and diſſolving the Coheſion of the thick or ſizy Blood: And as it reſtores the Elaſticity and corrugates the membraneous Coats of the Inteſtines, it's ſomewhat carminative. Water is not only an Alterative, but promotes all the neceſſary Evacuations of the Body: For drank in large Quantities warm, it vomits: drank more deliberately, in leſſer Doſes, with Exerciſe, it purges, eſpecially if *Venice* Sope, Honey, common Salt, *Epſom* or *Glauber's* Salt be added to it: And by diluting, dividing and diſſolving the Blood and encreaſing its Quantity, it's a good Diuretic; and in a deficiency of Blood or its thickneſs, or in an unnatural ſtiffneſs of the uterine Veſſels, 'tis an uſeful *Emmenagogue.* It's alſo found by long Experience a ſafe Sudorific, Diaphoretic, and Pectoral.

Water not only promotes the natural, but diminiſhes immoderate Evacuations. For cold Water ſtops vomiting, leſſens or cures a great Looſeneſs; is good in a *Diabetes*, or in an exceſſive Flux of the *Menſes*, mitigates profuſe ſweating; ſtops a prejudicial Perſpiration, and exceſſive Expectoration, except in old Age. From theſe Effects it follows that Water is good in Indigeſtion, and excites Appetite; it's a proper Liquor in an early Gout, occaſioned from an intemperate uſe of ſpirituous, tartarous, acrimonious, or glutinous Liquors; in a Rheumatiſm from diminiſhed Perſpiration, Sizineſs or Sharpneſs of the Blood. In the Stone it's both an excellent Preventive and Cure, while it exiſts only in a Maſs of earthy unpetrified Matter in the Kidneys or Ureters; in a Stiffneſs or Contraction of the Solids, and profuſe waſte of the Fluids, from any ſudden Paſſions of the Mind 'tis admirable, and alſo in Cramps, Convulſions and Madneſs, its Uſe is adviſeable, (except in old Age, or the Severity and Obſtinacy of the Diſtemper) when the Tone of the Solids is much weakened and almoſt worn out. 'Tis a great preſervative of Health and prolonger of Life, and, except in Perſons of lax Fibres, or aged, Water with Exerciſe clears the Intellectuals, brightens the Genius, and facilitates the Apprehenſions; for Wit flowing from ſpirituous Liquours is ſuperficial and flaſhy. Water drank with ſome volatile Spirits gives preſent Relief in a great Depreſſion from the Hippo, or Hyſtericks. It eaſes tickling Coughs or hoarſeneſs from roughneſs of the Veſſels or ſharpneſs or viſcidity of the Humours in the bronchial Veſſels; 'tis good in ſharp Pains, Scurvy, ſwimming of the Head, or Headach, from a Sharpneſs, thickneſs or Rarefaction of the Blood. In a moiſt Aſthma from Cold or debauchery, Water is proper, eſpecially, if a quick Pulſe, or Feveriſhneſs attend. In a Palpitation of the Heart, I have from Experience both in my ſelf and others, found its wonderful Efficacy when other things failed. In all Inflammations and Fevers, a ſeaſonable and Diſcreet Uſe of warm Water can never be too much extolled; in a Heat or Difficulty of Urine from a ſharpneſs of the Blood, in a Hiccup, Abſceſſes, and Ulcers of the *Viſcera*, Obſtructions of the Lungs, Jaundice, *Cholera Morbus*, Atrophy, Crudities of the Stomach, Thirſt, *&c.* Water is no deſpicable Help or Remedy. But having explain'd the Manner and Cauſe of theſe Effects more at large in two former Diſcourſes on this Subject, I have barely mentioned ſome of them here, and muſt refer my Reader to them for farther Satisfaction; briefly obſerving here, that Water it ſelf is a Kind of univerſal Remedy, adapted to moſt Conſtitutions, Ages, Diſeaſes, *&c.* *Hoffman* [a] very juſtly obſerves that the Efficacy of Mineral Waters in opening inveterate Obſtructions of the *Viſcera*, has a great Dependency upon the Quantity and Goodneſs of meer Water, however the Mineral runs away with the praiſe of it.

But here to prevent Miſtakes, which by the Raſhneſs of ſome, and Credulity of others, have been, and may again be of fatal Conſequence, give me leave to add, that tho' Water acts in ſome of the aforeſaid reſpects in all thoſe Caſes; yet I would not be thought to aſſert or imagine that it does ſafely ſo in all Conſtitutions, or in the ſame Conſti-

[a] p. 5.

Conſtitution at all Times: Nor do I propoſe Water as an abſolute Cure, in the above Caſes, or to be abſolutely depended upon; but only as a Preventive, Mitigator or Shortner of thoſe Complaints, and that which of all other Liquors may be uſed, at leaſt with the moſt Freedom and Safety. But ſtill there are a great many Inſtances in thoſe very Diſeaſes mentioned, wherein the Uſe of Water only would be both ridiculous and miſchievous. *E. gr.* Where they come from the Body's being exhauſted or rendered morbid by long Abſtinence, too poor and low a Diet, too great Evacuations, long watchings; in Dropſies alſo; from too great Diſcharges of the animal Juices, or in a Watery impoveriſhed ſtate of the Blood, with a Relaxation of the Solids. In worn-out old Age, in a fit of the Gout, where the Diſtemper has left the Extreams and ſiezed the Head, Stomach, Breaſt, or Bowels; in a relaxed State of the Fibres, and a ſlow Motion of the watery ſizy, poor Fluids. In flatulent Cholicks from a Weakneſs and Relaxation of the Tone of the Inteſtines, in Fluxes preceeded by a Cachexy, where the Blood is ſizy, Circulation ſlow, Spirits languid, Skin pale, the Legs or Feet ſwell and pit. In all white Swellings of the Glands, or in a low State of the Blood, where the Body is cold, and the whole Lymphaticks diſtended, white or pale, or in all Diſeaſes of the Head; in cold phlegmatick Conſtitutions, in aged People eſpecially. In Convulſions and Spaſms, from want of Blood and animal Juices, as after ſevere long Fevers, or great Evacuations whereby the Conſtitution is much impaired and almoſt worn out. In moſt moiſt Aſthma's, with ſeveral other Caſes, too tedious to mention.

Since Water conſidered as a ſimple Element, is endued with ſuch noble Properties, of ſo excellent a nature and capable of producing ſuch ſurprizing, and ſome of them contrary good Effects upon human Bodies, what may we not expect from it, when impregnated with a fine Spirit, mineral Salts, Sulphur, Foſſils, and a fine Earth, all the free Gift of the all-wiſe and bountiful Author of Nature? can any thing come nearer a *Panacea*; or is it not rather ſuch in chronic Diſeaſes; eſpecially when its prudent Uſe is attended with ſuitable Exerciſe, Avocation from intenſe Study or Buſineſs, innocent Diverſions, and a regular Courſe of Life; which were the things our ſecond Objector could not find in Mineral Waters, and overlooking which, he ſlipt into an Error.

15. But after the common Vehicle and Aſſiſtants, let us next inquire into the Contents themſelves; and firſt to prevent Miſtakes in our ſearch, and that our Expectations may not be fruſtrated, let us ſee what things they contain not, *Ex. gr. Sal Armoniac*, though ſome have ſought and pretended to find

it in Mineral Waters, yet it being a Compoſition of Sea-Salt, Soot and Urine, we are not to look for it there. There are alſo ſeveral kinds of Sulphur [a], which we are not to expect to find, nor the *Natrum* or *Natron* of the

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[a] There are ſeveral Sorts of Sulphur which we are not to ſeek after, as 1. *Auripigmentum* which in ſeveral Things reſembles Sulphur, being friable fuſible, eaſily inflammable, has a ſulphureous ſmell, tho' no volatile Acid, innocent and not injurious to animal Bodies; as Mr. *Boyl* was afraid, and is vulgarly believed: It becomes red by melting in the Fire; and then, but not ſooner, it diſcovers a volatile emetic Quality; from what I ſaid in the Preface we ſee the Error of ſuch as tell us that Orpiment is only Arſenic of a yellow or Orange Colour, being chiefly found in Copper Mines in a Sort of Glebe or Stones. Its Colour (ſay they) though always yellow, yet admits of diverſe Shades and Mixtures, as golden, pale, reddiſh, green, &c. From it are prepared red and white Arſenic, the laſt in common uſe; its Orpiment ſublimed with a Proportion of Sea Salt, the firſt is only the native rubified by Fire, &c. Nor 2. Amberſet, Ambergreaſe, for tho' the firſt two burn and flow in the Fire, and conſiſt of a liquid Acid, and foſſil Oyl, yet are they ſolid, neither are they the Product originally of our Climate. Nor 3. Theſe factitious Sulphurs made of Oil of Vitriol, Alum or Sulphur *per Campanam*, united with Oil of Turpentine, and other vegetable Oils; or with Charcoal, Pitcoal, fixt Salts and an inflammable Oil, with ſuch others as Mr. *Geoffrey* invented the Art of compoſing. Nor 4. That Sulphur called *Oleum Terræ*, this being formed only in *Aſia* whoſe petty Kings keep it to themſelves, and what's exported to us under that Name, is prepared from the expreſſed Juice of the Cocao Nut and medicated earthy mixt. Nor 5. *Petræolum* which flows down Rocks from melted *Bitumen*; is thin light and fœtid, wholly inflammable, and whenever it ſwims on the Surface of Waters, is ſo like diſtilled Oil, that many believe it melted by a ſubterraneous Fire, this differs from Liquid *Bitumen*, only in its thinneſs and clearneſs. *Naptha* is a thin, clearer, finer Sort of *Petræolum*, it greedily catches fire, is ſo retentive of it, that 'tis ſcarce extinguiſhable, being the ſubtileſt or fineſt Part or Flower of *Bitumen*; this Kind of Sulphur is met with in hot Countries chiefly. *Olearius* ſaw thirty Springs of it near *Scamachia*, in *Perſia*. There's a little of it found in the South of *France*, but the beſt in *Europe*, is that from the Duchy of *Modena* in *Italy*, diſcovered in 1640 by *Arioſto*, a Phyſician in a very barren Valley 12 Leagues from *Modena*: Out of the Rock are three Canals dug with great Expence, out of theſe are gathered into Baſons or Reſervoirs three different ſorts of Petreol, the firſt white clear and fluid as Water, of a briſk penetrating and no ways diſagreeable Smell. The ſecond a clear yellow leſs Fluid, and not of ſo briſk a Smell; the third of a blackiſh Red, and thicker conſiſtence, and a Smell more like that of *Bitumen*. Mr. *Bolduc*, who in 1715 made many Experiments on it, found he could not raiſe any Phlegm or ſaline Part from it by Diſtillation; either in *Balneo Mariæ*, or in a ſand Heat he could only raiſe Oil from it, and at the Bottom of his Pellican remained a very ſmall Quantity of a thick browniſh Matter; this Kind of Sulphur is a Remedy ready prepared by nature, being warm and penetrating, of wonderful Efficacy in Rheumatic and Arthritic Pains, and paralytick Limbs: Philoſophers will have this to be the Work of ſubterraneous Fires, ſubliming the more ſubtile Parts of bituminous Subſtances, that lie in their Way. Theſe Parts being again condenſed into a Liquor, by the Coldneſs of the Vaults or Rocks, being there collected and ouzing through Clefts and Apertures which the Ground

Ancients; [b] nor factitious Salts, theſe being not the Product of Nature, but of human Invention, [c] as *Sal Glauberi*, *Polychreſt*, &c. nor vegetable Salts, as Salt of Tartar; nor animal Salt: But to leave theſe Contents to their proper Places.

Ground furniſhes them with. *Naptha* is yet a finer, clearer Bitumen than the laſt; it ouzes out of ſeveral Parts of the Earth in *Chaldea*, eſpecially near the ancient *Babylon*; it's alſo found in ſeveral Places of *Italy*, and *France*, as in *Auvergne* and *Raguſa*. This is ſoft and black like liquid Pitch, and of a fetid Smell; but that of *Italy* is much Finer, being a Kind of Petriol; whereas the other is chiefly uſed in Lamps, or for penetrating, reſolutive and vulnerary outward Applications. *Voſſius* has wrote a particular Treatiſe of it: *Naptha* in *Chaldee* ſignifies Diſtillation.

[b] Nitre of the Ancients is a Mineral or Foſſil, dug out of the Mines of Nitre, ſays *Serapion*, like thoſe of common Salt; it was formed out of running Water, congealed in its Progreſs into a Sort of Stone. This Nitre was of four Kinds, according to the Countries whence it came, *viz.* *Armenian*, *Roman*, *African* called *Aphronitre*, *Egyptian*, which was the moſt famous of all, and gave Name to the others, being ſo called from *Nitria* a Province in *Egypt*, which afforded it in greateſt Plenty; and he ſays it was of diverſe Colours, white, red, and livid; ſome porous like a Spunge, others cloſe and compact, others tranſparent like Glaſs, and ſome ſcaly. But *Geo. C. Schalmer*, *De Nitro tum veterum tum noſtrorum*, ſays the Ancients diſtinguiſhed between *Nitre* and *Aphronitre*; and ſays that *Agricola* was miſtaken, when he tells us that there was anciently Nitre dug like Stones, out of a Quarry in *Lidya*, *Magneſia*, *Caria*, &c. and that the Nitre uſed by the Ancients was brought out of ſeveral Countries mentioned by *Pliny*, lib. 31. c. 10. A Lake in *Macedonia*, whoſe Water was nitrous (and yet in the Middle of it was a Spring of freſh Water) furniſhed the moſt and beſt Nitre; it was called *Calluſtricum* from a neighbouring Cape in the Gulf of *Theſſalonica*, and during the Dog Days the Nitre was formed like the Cruſt on the Surface of the Waters. The Water of the Lake *Aſcanius* in *Bithynia*, and thoſe of certain Springs near *Chalcis*, were ſweet and potable at the Surface, but nitrous at Bottom, a Nitre was alſo gathered in the Ground near *Philippi* in *Thrace*, but it was both little and of no value. The Valley of *Media* alſo furniſhed ſome; and there were Nitre Pits in *Egypt*. The Nitre of the Ancients was drying, deterging and attenuating, was very ſerviceable in Ulcers, Itch, diſorders of the Eyes, Gout, bitings of Serpents, &c. Its uſe inwardly was to attenuate groſs and viſcid Humours, but they were ſtrangers to it's cooling Quality.

[c] Artificial Nitre or Salt Petre, is of two Kinds, *viz.* mineral Salt Petre, found in ſundry Places in the Kingdom of *Pegu*, and about *Agra*, in Villages antiently populous, but now deſerts. It's alſo found in ſeveral Places along the Banks of the *Wolga*. It is drawn from three different Kinds of Earth, *viz.* black, yellow, and white; the beſt comes from the black, being freeſt from common Salt, and needs no purifying, for making of Gunpowder. Mr. *Homberg* ſays all our Salt Petre is either from Earth moiſten'd, and manured with the Excrements of Animals, or from old Walls or the Plaiſter of ruined Buildings, which have been filled with ſulphurous Matters, as well from the Animals which inhabited them, as the Soot penetrating them, and the Air encompaſſing them; the other Kind of factitious Salt Petre, is that prepared from nitrous Matters collected in old Buildings, Dovehouſes, the middle of antient Ruins, &c. By means of *Lixivium*, or Lyes made of Wood Aſhes, and ſometimes of thoſe of Herbs of this Sort, the Arſenal in *Paris* affords us large Quantities: The Nitre ſaid to be in the Air, is only a compound of marine Salt, vegetable, animal, terreſtrious and foſſil Salts, from pit Coal, and Wood which are volatile; but Nitre is no more volatile than Sea Salt.

16. Whatever the diſſolvable Ingredients are which impregnate Mineral Waters, tho' the Materials may be the ſame, yet are their Proportions often found varying, according to the different Seaſons of the Year, Temperature of the Air, and Quantities of Rain: For ſometimes great and continued Rains do ſo waſh down and carry off the Salts, and other mixed Subſtances in the Waters, that they are not only unfit for drinking, but either ceaſe, or at beſt produce their wonted Colours with Galls or other Ingredients but faintly; eſpecially where either the impregnating Principles lie ſhallow in the Earth, or the Springs lie low or near ſome other freſh Water; or where the laſt is mixt with, or drains into the firſt. There are ſeveral Ways to try whether, or how much ſuch Waters have ſuffered by Rain or Inundations, or are mended by Drought, as firſt, let the given Water, when richeſt of its Minerals be compared with any other Water of the ſame Kind, with Galls, Tincture of Rhubarb, Logwood, Nephritic Wood, or any other colouring Ingredient; then ſee on which ſide the Difference lies, and how much common Water will lower the ſtrongeſt to bring it to the ſame Colour or Shade, with the weaker, (both being ſuppoſed freſh and genuine, and the Quantity and Strength of the tincturing Ingredients being exactly the ſame in both) and when you find or imagine the ſtronger to be weakened by Rain, try how much leſs common Water it will bear; that is, how much more Water the ſame Quantity taken up in a dry Seaſon, will bear to bring it to the ſame Strength with that taken up in a rainy Seaſon. Secondly, put them to the Trial of the *Hydroſtatical* Balance, and ſee how much more they are heavier or lighter than in Drought, for if they are highly impregnated with a Mineral Spirit, they will be heavier after much and ſevere Rains, but if chiefly impregnated with much fixed Parts, they will be lighter, as theſe too diſcover how much its volatile Parts have ſuffered, Thirdly, exhale any given Quantity, and ſee how much its fixed Parts are diminiſhed by Rain, or encreaſed by Drought. But after all, it's not every Rain that hurts the medicinal Quality of Springs, for a moderate Rain ſometimes ſtrengthens them, eſpecially after a long Drought, by waſhing down the Salts into their Channels, which during the dry Weather, might be concreted in the Pores of the Earth, Chinks of the Rocks, or Sides of the Crannies or Channels. Indeed there is no certain ſtandard for the Weight of Waters, being ſcarce ever one Day exactly the ſame, but always varying from the Air and Fire contained in them, for as the firſt is more or leſs rarified, the Water will be lighter or heavier; the Weight is alſo varied according to the ſundry Proportions of Materials the Water brings along with it at different Times, and from

ſeveral other Accidents, and even the Air it ſelf has no certain ſtandard, for the more or leſs Water there is in it, the Baſis of its Pillar will gravitate more or leſs on the Surface of the Water, or Body weighed, ſo that it is impoſſible abſolutely to determine the ſpecific Gravity of any medicinal Spring.

17. Again, it is not impoſſible, but medicinal Springs may riſe up where there were none before; and alſo that ſome of one Nature or Property may be changed into another, if Firſt we allow what Mr. *Boyle* advances, that ſubterranean effluviating Bodies, have in them a propagating or ſelf-multiplying Power, or a ſeminal Principle, or of the Nature of Ferments, or what Mineralogiſts have obſerved, that ſome metalline Ores or mineral Earths, are changed, and afford metallic or mineral Subſtances, which they did not before, or at leaſt not ſo well qualified or ripened; wherefore ſome Springs, which were only common Water before, when theſe mineral Subſtances are ripened, and ſome of them continually in *Embryo*, may become medicinal Waters. Secondly, From the deep and inacceſſible Caverns of the Earth, wherein are vaſt mixtures of Bodies, may ariſe into the Mines, hid under the Earth's Surface, either continually or periodically, great and various Exhalations, which ſtill repair the Loſs of thoſe Salts and mineral Subſtances, which either the Water waſhes off, or aſcend up into the Air, therefore, ſay they, the Waters are ſtill good. Others contend for ſome accidental acceſſion and combination of freſh mineral Subſtances with the former; hence a new Mixture which impregnates the Water with adventitious Minerals, and changes it's Nature. But,

18. It is likewiſe probable, that ſome Waters once reputed medicinal, may after ſome Centuries loſe this Quality; hence Poſterity may afterwards look upon them as fictitious or ſuperſtitious, but with injuſtice; for at the Expiration of ſuch a Time, the Pores or Chaſms of the Earth, which gave vent to the impregnating Principles from the Abyſs, may be plugg'd up with ſolid or other Matter, ſo as the firſt is obliged to find or force another Courſe, and is diſcharged by ſome different Outlet. Secondly, They may be altered from combinations with other different Bodies, or by ſome accident in thoſe deep and dark Receſſes, whereof we can give none, or at beſt a very uncertain Account. Thirdly, The mineral Subſtances which impregnated thoſe Waters, may be wrought by Miners; or their Spades, or other Tools coming too near the Springs, may have turned them into ſome new Courſe, not yet diſcovered. Fourthly, The former Chaſms or Chinks in the Earth or Rocks may be diminiſhed or obſtructed by ſeveral Accidents, no one of the Diviſionof whoſe Waters may retain either the whole or ſome part of the Virtue of the firſt

Spring. Fifthly, It may happen from different Bodies acting upon one another, which ceaſing, the Succeſs of the Water fails, or from Earthquakes, or other ſudden and violent ſubterraneous Commotions, which ſhaking or ſuddenly claſhing ſome parts of the Earth againſt another, obſtruct ſome Channels, and open others, or from a ſudden Inundation carrying down before it that part, where the Spring roſe up, or its Minerals were hid, or from ſome River or Brook changing its Courſe, and falling into the Spring.

As to the Things theſe Waters do contain, it is the Deſign of this Work to ſearch out.

PART I.

PART I.

Of the Warm WATERS.

A More early Diſcovery, general Acquaintance, and continued ſeries of Succeſs, for many hundreds of Years, of ſome of theſe Waters, oblige us to take them in their Order, and pay our firſt Compliment to them; for it's certain, that as to priority of Uſe or Writings, the *Bath* in *Somerſetſhire*, and *Buxton* in *Derbyſhire*, challenge the Precedency of the whole mineral Waters of *England*; the laſt without all diſpute having been as well known to the *Romans* as the former; which is evident, firſt from the Remains of the ancient *Roman* Brickwall about St. *Anne's* Well, which, together with its Baſon, was totally razed in 1709, when Sir *Thomas Delves* of *Cheſhire* erected the preſent beautiful Arch over that noble tepid Fountain. *Secondly*, About thirty ſix Years ago, when Mr. *White*, then of *Buxton-Hall*, was driving up a Level to the *Bath*, fifty Yards Eaſt of St. *Anne's* Well, and fourteen Yards North of *Bingham* Spring, the Workmen found buried deep under the Graſs and Corn-mould, Sheets of Lead ſpread upon great Beams of Timber, about four Yards Square, with broken Ledges round about, which had been a Leaden Cyſtern, and not unlikely, that of the *Romans*, or ſome other antient Bath, which had been ſupplied with Water from *Bingham* Well. *Thirdly*, From the *Roman* Highway from *Burgh* (a ſmall Village Seven Miles Eaſt) to *Buxton*, a great Part whereof remains entire to this Day, and reaches within half a Mile of *Buxton-Hall*, and not improbably it took a turn from *Burgh* to *Caſtleton*, two Miles North Weſt, for above this, on the Top of *Maniton*, is remaining a very beautiful and ſtrong Camp. All for two Miles below, is a fortified Station four Square, the Town a Garriſon, and the Caſtle above it a Fort, Armory, or Watch Tower, to anſwer the Camp. *Fourthly*, That it was of great Repute in the darkeſt diſtant Times, is undeniable from the Chapel here dedicated to St. *Anne*, whoſe Foundation was likewiſe diſcovered, and a large Piece of its Wall dug up in driving the foreſaid Level; and no doubt ſeveral other valuable Pieces of Antiquity might have been found there then, had there been preſent any Perſons of Judgment and Curioſity.

Buxton-Hall is ſituated in a very ſmall Valley betwixt two Mountains on the South Brink of the Rivulet *Wye*, or *We*, from the Union of three Springs, a ſhort Mile Weſt of the Houſe, called *I*, *Thou*, *He*, which being united, obtain the plural Number *We*. On the North Side of the River, is a ſteep Mountain covered chiefly with Heath, under which is a black Moſs, or peat Earth, below that a Shale, then Clay and Coal, and Lead in ſome Places, beſides plenty of Braſil, and Sulphureous Exhalations, gilding the Subterraneous Rocks like Leaf-gold, Iron-Stone in plenty, and much Sulphur. The Surface here is very barren, and therefore return we to the South Side, which for about two Miles, is a Mountain of an eaſy Aſcent, conſiſting chiefly of Limeſtone, which with a coarſe Coal got near, is burnt and carried into *Cheſhire*, *Lancaſhire*, and the Neighbourhood, both for Building and manuring of Land: I found here no leſs than nine or ten different Sorts of Limeſtone, *viz.* a White of a very coarſe Grain, another White of a very fine Grain, and a brown Limeſtone; theſe are eaſily burnt, and make good Manure for Grounds, but not ſo fit for Building, of outer Walls eſpecially; for the Lime being expoſed to the Air and Weather, ſoon moulders and peels off. From none of them unburnt, could I obtain either fixt Salt or Sulphur; theſe begin pretty high upon the Hill, and run down a good way in Beds under a thin Corn-mould. But lower down nearer the *Bath*, we have a dark brown, a gray, a blackiſh, and jet black Limeſtone, and one between a black Marble and a Limeſtone, whoſe Grain and Colour take a fine poliſh. It is both difficult and expenſive to burn theſe, and is ſeldom done except for building Bridges or Churches, for it preſently turns hard after working, and is of perpetual Duration, even more laſting than the Stone itſelf, neither Air, Time, nor Weather, weakening its Cement; but the Farmers find it inferiour to the firſt for their Purpoſe. The three laſt, either broke or ſtruck with a Hammer, being very full of Sulphur, ſtink intolerably. Moſt of the jet black are of a very irregular Figure, full of great Knobs or Lumps, the leaſt Bit whereof broke off ſends forth a moſt inſufferable Smell, which ſenſibly ſtrikes the Noſe of the Standers by; it contains much ſolid *Bitumen*, and ſeems as though it were forcibly melted Sulphur and Stone Powder, thrown up by the Vehemence of a ſubterraneous Fire, and condenſed under the Earth's Surface, tho' we have no Evidence of any ſuch Fire. A Piece of this Stone taken freſh out of the Earth powdered and infuſed in a cloſe

Veſſel of boiling Water, and let ſtand till it becomes clear, tho' it ſmell not, yet turns a Solution of Silver of a browniſh Colour; but burn this Stone, mix it with a little Roll Brimſtone, pour boiling Water on them, and the Noſe is inſtantly ſtruck with a very diſagreeable Smell, but ſet this Mixture upon a Chaffing-diſh of Coals in the middle of a Room to boil, and you have preſently an inſupportable Stink; pour off this Water, let it ſtand till it's clear, and it turns the Solution of Silver black as a Raven, thick and opake, crudles and lets fall a jet black Sediment, which being dried and thrown upon live Coals, burns with much Stench, and a blue Flame. Hence we ſee, *Firſt*, That the blacker this Limeſtone is, the more it abounds with Sulphur. *Secondly*, That Limeſtone opens the Body of the Sulphur, ſo that it communicates ſome of its Parts to Water. *Thirdly*, That the coarſe white Limeſtone affords no warm Water, nor diſcovers Sulphur by blackening a Solution of Silver.

In the middle of this Limeſtone are round, oblong, ſquare, or other ſhaped Pieces of Ironſtone, ſeveral Fragments of Copper Ore, Lead Ore, Braſil; and nearer the River is Shale, with ſome ſmall Seams of Coal no thicker than a Crown Piece: This freſh Shale powdered, warm Water poured on it, and let ſtand in a cloſe Bottle till it cool and clear, then the Water poured on Tincture or Powder of Galls, becomes Purple in three Hours; and this is common to all the Shale I have met with and tried. Every Judge of Foſſils muſt own that this is more different from Slate than the Pyrites; for as Galls ſtrike an Infuſion of Shale in warm Water, of a Purple colour, Slate will not, except there happen to be a Mixture of Ironſtone or Ocre in it. Slate by being expoſed to the Air, becomes hard, more ſerviceable and durable; Shale on the contrary moulders into exceeding thin Flakes like Leaves of fine Paper, and then decays to a black Powder. All Shale by rubbing between the Fingers, Powders, but not Slate. Shale waſtes the Lead Ore near it by its ſtrong Acid. Where there are great Quantities of Shale and Braſil, the Waters are ſo extreamly cold, that Miners, who work long therein, are in danger of loſing their Limbs. Braſil abounds in the Coal-Pits, Lead-Mines, Ironſtone-Beds, and Limeſtone near the River; It is of ſeveral Colours, like *Spaniſh* Brown, fine Gold, burniſh'd Silver, Lead, Tin, *&c.* but all diſcoverable from their prodigious Weight; hence its Weight and Colour have impoſed upon many ignorant People, and put them to Labour and Expence in expectation of *Peruvian* Gold nearer Home. If *Aqua Fortis* be poured on ſome powdered Braſil, a very ſmall

Fermentation follows with a Solution of a little Metal; a Piece of Braſil put in the Fire, ſtinks intolerably [a]. Hence we have theſe Obſervations.

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[a] From ſeveral Papers communicated to me by a Gentleman, I find that in the Years 1721 and 1722, there was a Deſign on Foot, and a cloſe Correſpondence between the Reverend Mr. *Richard Peat* of *Wirkſworth* in *Derbyſhire*, and a Brother-in-law of his, Mr. *Thomas Chapman*, to make great Matters of this Braſil or ſulphureous Subſtance. The laſt projected the Scheme, and the firſt deſired that he would bring ſomewhat to Perfection before he put him to the expence of unneceſſary Poſt Letters. They divided the Undertaking into ſix Shares, Mr. *Chapman* had one, and two more by Mr. *Peat*'s Order he ſold to Eſq; *James* at 200 *l.* who had often tried the Oar, and found what it contained, as he imagined.

July 15, 1721.

Dear Brother,

" According to your Direction, I have exerted my ſelf to anſwer the Truſt repoſed in me, you having given me one ſixth Part, and committed two Sixths more to my Diſpoſal for the Uſe of the whole Undertakers: I have therefore ſet the two Sixths which are amongſt us all, at the Price of 200 *l.* to Eſq; *James*, who has tried the Ore here, and will ſend off a ſpecial Meſſenger on *Monday* with my Letter to you, to ſee the Situation and Depth of the Mine; treat him with the utmoſt Civility, becauſe his Maſter is a Favourite at Court, and an Artiſt in the Buſineſs, but bate nothing of the Price I have ſet it at, becauſe it will take: I underſtand by him, as well as my own Tryals at *Derby*, that there is a vaſt Quantity of Quickſilver in the Ore, beſides *Sol* and *Luna*, therefore I thought fit to drop a previous Advice, for what I write by the Meſſenger will be expos'd to publick View.

Yours.

July 28.

" The Bearer is employed by Mr. *James* and Partners to view the Situation and Depth, and to try the Ore there; he is to have the Liberty of employing what Number of Hands he thinks fit, to ſink or drive any where upon the Premiſes, at their own proper Coſt and Charge, but they are not to have any Share of the Profits, till the Purchaſe Money be paid, but upon the receipt of the ſaid Money, we are obliged to entitle them to the ſaid Shares."

Dear Brother,

" The Perſon that I informed you I was treating with about the Purchaſe of the Ore in groſs, has tried it ſeveral times in my Preſence, but our Pots all failed in the Fire, but after all our Tryals we are confirm'd in this Opinion, That ſuppoſe our Pots ſhould hold, they would not draw above the tenth part of what is really in it. I am ſatisfied from what I have ſeen and done myſelf, that the powdered waſhed and dried Ore, contains above 2 *s.* and 6 *d.* in the Pound. I ſhould have had forty or fifty Shillings worth of Quickſilver Yeſterday, out of fifteen Pound of prepared Ore, had my Pot held, but it breaking, I loſt both. We ſhall try it next with *Aqua Fortis*, and *Aqua Regia*, ſo our Profits will be ten times greater, and eaſier come at."

Feb. 6. 1721-2.

" I am ſurprized to find, that tho' you had entruſted me with a Power to act and diſpoſe of your Shares, which you had neither revoked nor withdrawn, yet you are ſeduced by the pernicious Counſels of a wicked Impoſtor and Deceiver, an Agent ſent up by you, and inveſted with abſolute Powers under your own Hand and given him one Share, which I would have ſold at a great many hundred Pounds

" to

tions, Firſt, That theſe warm Springs riſe from a confuſed Heap of Limeſtone, Sulphur, Ironſtone, Coal, Copper, Lead, *&c.* Secondly, That Shale is a Medium between Stone and Coal. Thirdly, That Braſil is a concretion of Sulphur, Mercury, and Earth, but the Sulphur carries off the Mercury in the Fire, and leaves only a ſcantling of inſipid *Calx* of Earth behind.

The

“ to a Merchant belonging to the Mine
“ Adventurers, who being Lords and Knights
“ are Men of Character, and would have
“ been far better Chaps to you than this
“ fortunate Blunderer, who has taken away
“ your old Senſes, and has been very fortunate
“ in ſecuring that which will make him
“ great ; for I can prove to their Faces,
“ that the worſt Braſil will produce 12 *l.*
“ 10 *s. per* Tun in Quickſilver, beſides
“ good Sterline, *&c.* I will engage that one
“ Man will manage two Tun and a half
“ *per* Day to Still out the Quickſilver, and
“ when that is done, it is prepared for Melting
“ for Sterline. The Mercury that comes
“ out of this Fellows Day's Work is worth
“ thirty Pounds and a Crown. The Method
“ to procure it is this : You muſt get made
“ Earthen Pots, or Still Bottles, that will
“ contain One Hundred Pounds *per* Bottle,
“ they muſt be like other Bottles, but
“ a ſtrong ſhort Neck, the Mouth about
“ three Inches Diameter, every one whereof
“ muſt have an Iron Pipe about twenty
“ ſeven Inches long, which let be fixt into
“ the Bottle at one End, and luted with
“ ſtrong Clay tempered with Horſe-dung
“ and powder'd Glaſs to prevent the eſcape
“ of the Quickſilver between the Mouth
“ of the Bottle and Pipe, and muſt be
“ turn'd down four or five Inches at
“ the other End, that it may be two or
“ three Inches immerſed in Water all
“ the while the Work is doing ; theſe
“ Bottles muſt be filled only half full,
“ becauſe of the great Quantity of Sulphur
“ in the Ore, and let ten of theſe be
“ put at a time into the Fire. The
“ Furnace muſt be built oblong, about
“ twelve courſes high, and ſo long, that
“ five of theſe Bottles may ſtand
“ lengthways, with room for the Charcoal
“ to fall round each Bottle, and ſo broad
“ as to hold another Row with convenient
“ room for the Fire to fall between.
“ But your Still Bottles are only to reſt upon
“ a Brick end four or five Inches from the
“ Bottom. As to the Sizes and Courſes
“ of Bricks, that muſt be according to the
“ Size of your Bottles, with a Conveniency
“ left in the Wall for the Still Pipe
“ to lie ſtraight for its better emerging ;
“ after Diſtillation, the Ore muſt be fluxed
“ with Salt-petre, Argil, Borax, and Glaſs-Bottle ;
“ this will make it flow ſo thin,
“ that the Metal will fall to the Bottom ;
“ pour it into a taper Veſſel or Hole in the
“ Sand when cold. The Slag and Metalline
“ Part will fall aſunder. After the firſt
“ Melting, your Slag is the beſt Flux that
“ can be. Pound the Metalline Part, and
“ waſh it carefully in a Bowl ; and all but
“ what you ſee to be Silver at this firſt running,
“ between that and the waſhed, is
“ all to be refined. But tho' this Flux
“ enough, yet to try the Ore with it as it
“ is, without its being deliver'd of its
“ Sulphur, would either be all together in
“ vain, or at leaſt very trifling. By this
“ Method a ſmall Quantity of Fuel will
“ do ; this is all the Advice needful at preſent,
“ only light your Fire at the top,
“ that it may heat leiſurely. Let the top
“ of your Bottle be fully covered. When
“ the immerged Pipe has done ſmoaking,
“ its work is over. Pound and ſift all
“ your Ore, and then one Bottle will ſerve
“ a great many times. Between one Brick
“ and another, muſt be half an Inch unpointed
“ for the Air, and the Brick end
“ in the ſecond Courſe, muſt meet in the
“ middle of the firſt Courſe. This right
“ underſtood and uſed, the Profit of two
“ Days Work will put you in Stock for

H “ pur-

The black and indeed moſt of the Lime-Stone in the *Peak* abounds with Shells of Cockles, Oyſters, and Eſcalops, the laſt whereof I found was always univalve; but of any Place in *Derbyſhire* there is the greateſt Plenty of theſe Shells at *Buxton* and *Stony Middleton*; but the following Conſiderations ſatisfy me, that they are Supernatural and never were caſt in animal Moulds. *Firſt*, here are Univalves as well as Bivalves. *Secondly*, there's plenty of imperfect as well as perfect Shells, ſome forming, others formed and hard. *Thirdly*, ſeveral of them have their Lineations in a quite contrary Courſe to thoſe of Shelfiſh of the ſame Kind repreſented to us by thoſe Figures. *Fourthly*, ſome of thoſe which are always ſmooth in Shelfiſh, are here of the *Peclinites* Kind; on the contrary ſome of the *Peclinites* Kind have neither Curves nor Lineations here, but are quite ſmooth. *Fifthly*, ſome of them are looſe in the Earth, and monſtrouſly exceed the Life. Go on but a Mile from *Buxton* to *Pools Hole*, and there we meet with other animal Figures, *viz.* a fair Repreſentation of a human Corps laid out, another of a Lyon couchant; and alſo ſome beautiful Tracts of domeſtic Utenſils, as the fore Part of an old faſhioned Chair, a ſet of Organs, and ſome vegetables upon the Walls of the Cavern, as fine expanded Fern Branches, *&c.* Now if any one is ſo credulous as to believe that the firſt was once a living human Body, the other a real Lyon, the laſt a Chair, Organs, vegetating Fern, *&c.* then I am content he ſhould alſo think that the other might once have been living Shelfiſh. One Shell I found at the Hall, altogether unlike any of the living Kind, it was a Univalve, above a quarter of a Yard long, the Colour of Iron ruſt, very ſmooth, and near its juncture, were like two great Waggon Nails, on the one Side, and one in the Middle between them on the oppoſite Side, about two thirds driven in, and about a quarter of an Inch Diſtance between the Inſide of the Nail-head and the Shell, a little of it broke off and was exactly like ruſty Iron. Another of the Eſcalop Kind I found, exceeding large and ſmooth, but theſe laid looſe in the

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“ purchaſeing whatever will be neceſſary for a full Proſecution. I have given away an eighth Part here between the Refiner and the Founder that operated. But the Quickſilver muſt be firſt taken and the Sulphur deſtroyed, before you can melt to any Profit for the Sterline. If ever our conjuring Impoſtor procure an Ounce of perfect Metal of any Kind by his Way of working, I durſt be bound to give a hundred Pounds for it.”

“ *Feb.* 13. I am ſatisfied the Mine will afford us more than fifteen thouſand Pounds *per Annum*, all charges payed, at the Rate of fifteen Tunn *per* Week containing three Pence *per* Pound Sterline, and three half Pence *per* Pound Quickſilver, ſo that I cannot ſay, whether it be prudent to ſell at any Price.

Thus we ſee what great Work, large Expectations of vaſt and ſudden Riches, yet all proved but a ſhort lived Bubble.

Earth. Some Pieces of the black Stone are ſo full of Shells, that in a ſquare Inch you may ſee twenty diſtinct ones, of different Magnitudes, but all of the ſame Kind. The Method to get them whole out of the Stone, is, when you ſee a perfect beautiful Shell in the Stone, firſt heat the Stone an Hour or two in the Fire, take it out, and carefully chip off the Stone about the Shell, till you ſeparate them. Some of them are one Shell, ſome an endleſs Heap of Shells, or very thin Scales thereof, which chopped off round about, you have ſtill an intire Shell of the ſame Kind, and ſo on till you come to its Centre.

A little South of *Pools Hole*, (which is reckoned one of the Wonders of the *Peak*[a]) and a Mile South Weſt of *Buxton*, is a Cart Way, where,

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[a] Though ſo much has been Written about the Wonders of the Peak, it may not be amiſs to give a fuller and juſter Account of ſome of them than I have yet met with. A very little Mile Weſt of *Buxton* is *Pools Hole*, probably ſo called from one *Pool* a fugitive or criminal Offender againſt the Law, who took Shelter here; the Rock over the Front of its Entry is ſeven Yards perpendicular, the Breadth of the outer Entry at the Ground is nine Yards, the Door into it is two Yards and a half wide in the Rock, here the Height is from three to five Foot, therefore muſt we enter ſtooping for eighteen Yards, before we can ſtand up. Then we are admitted into a large Cavern twenty Yards high and ten broad, till at laſt its Height riſes from twenty to forty five Yards, and from twenty to fifty wide; when you are come twenty eight Yards from the outer Entry, you come to *Pools* Shelf, which is a great long broad Flagſtone, lying over Head the whole Breadth of the Entry: Juſt on the right Hand, about five Yards above the Level, is *Pools* Chamber and dining Room, which ſhelve into the Rock a pretty Depth; from this Shelf you enter another ſmall ſubterranean Paſſage, on the left Hand, which opens into the other at the *Queen of Scots* Pillars, but here is nothing remarkable. Therefore return we to the firſt, when you are gone ſixty Yards in, you riſe up a ſteep Aſcent, and leave a Hollow on one ſide, climb up eleven Yards and a quarter to the Flitch of Bacon, of which whoever can ſee any Reſemblance, have a ſtronger Fancy than I. Fifty eight Yards beyond this is the Font, which is four Foot high, and ten Foot in Circumference at bottom, with a ſmall Baſon of Water on its top, which drops from the Roof, and has bred this large Pedeſtal: Juſt by theſe on the ſame Side are four very large ſtalactitious Concretions called Haycocks, and are very like them. Six Yards beyond the Flitch is the Queen of *Scots* Chair, whoſe fore and lower Part is exactly the Form of an old Chair. From the Font to this Chair are moſt magnificent, high, perpendicular Walls of beautiful carved Work, exceeding the ſtatelineſs of the greateſt Monarchs Palace, adorned with Variety of Figures as well of Vegetables as others. Nine Yards beyond the Chair, is the Lyon couchant lying upon his Belly on a Stone, with his Head up: Juſt by it is the Effigies of an old Man dead and laid out of a dun blackiſh Colour; two Yards and a half further is the Queen of *Scots* Pillar, and all upon the oppoſite Wall is very noble carved Work of the Stalactites. Thirty four Yards further is St. *Andrews* Needle, which is a ſmall Paſſage of three Yards long under a great Stone; you aſcend ſixty Yards and a half beyond this up a moſt frightful Precipice of Rocks, in climbing which, be ſure your Claws be in good Order, for you muſt be vaſtly indebted to them if you return ſafe, this Aſcent being forty Yards above the

in a bright Sunſhine, immediately after a ſharp Rain, the poor People gather ſmall Cryſtals conſiſting of two Hexagonal Pyramids, and an intermediate Hexagonal Column, they are all of the ſame Figure, tho' of very different Magnitudes, and if any appear otherwiſe, they are either broken or imperfect; they naturally have all a moſt beautiful Poliſh, are of

Level and all a rough Rock, reaching very near the Day. When you are here, your Candles ſeem twinkling Stars to the Company below, as theirs do to you. Here you are at the far end of the Cave: At the Foot of this Precipice riſes up the Water, which glides gently along the Side of the Hole to a Swallow which drinks it in except in a very great Flood. The Organs are between the Queen of *Scots* Pillar and the Lyon. The whole Length of this Cave is two hundred and thirty Yards.

Five Miles from this, juſt by *Caſtleton*, is *Peaks Hole*, or the *Devils Arſe in the Peak*; it lies on the South Weſt, or South ſide of *Caſtleton*. About ſixſcore Yards before you come to the Entry into this diſmal Cavern, on the left Hand, is the Ruſſet Well, which riſes up with ſuch an impetuous Force, that it throws back great heavy broad Stones, or pieces of Wood thrown into it; it throws out a Quantity of Water ſufficient for three or four overſhot Mills; its Depth I could not take, being filled up with great Stones. It is about a Yard over, and riſes from below the Caſtle Yard, and whether this might not be the Spring that ſupplied the Caſtle above it with Water, or whether the third River in the Cave does not diſcharge it ſelf this Way, or whether both, is uncertain. However it forms a large Brook or ſmall River which runs thro' the Town and has a Stone Bridge over it.

Over the Entry into this Cave both before and on each Hand, is certainly the moſt auguſt and awful Front in the Univerſe, being fifty two Yards and a half of a Perpendicular Rock on the right Hand; and ſeventy five Yards and a quarter high on the left Hand; and directly front from the Caſtle Wall to the Ground, is eighty nine Yards and a half; the Precipice which ſlopes down all the Way on the left Hand from the Caſtle is above two hundred Yards long, that on the right is above one hundred. The Breadth of the outer Entry is above forty Yards, and about thirty high, and all a ſloping Bank from the Bottom on the left Hand to the Side of the Rock on the Right, where is the Foot Way into it. From the Fall of the Drop at the entry to the faireſt of the four poor Cottages within the Cave's Mouth is thirty five Yards three Quarters: Theſe Cottages were formerly ten, but now reduced to four, only covered over with Straw and Ruſhes, no Walls nor Chimneys, but a few Stones cobbled up about three Foot high. The Rock ſerves them inſtead of a Roof; their Cover is a poor Shift to break the cold Blaſts: A little from the faireſt of the Cottages to the Top of the Steps or top of a gentle Deſcent on a ſand Bank thirty nine Yards and a half; the breadth of the Cave here is twenty eight Yards and a half; a little on this Side is the Flitch of Bacon, tho' as like it as a Horſe is like a Church. Oppoſite to the Flitch of Bacon on the left Hand, is the Entry into another ſmall Cave called the Swine Hole, which is twenty eight Yards and a half long, two wide and two high. This has the ſmootheſt drieſt Roof of all, being directly under the Caſtle. When you are got in twenty eight Yards you come to the four Cave Ends, where you have one Cave goes ſtraight forward, but ſo filled with Stones brought thither by great Floods of the Rivers in the Hole, that I could not get into it; on the left Hand is another Cave, no End whereof I could ſee; on the right Hand is a third, with a very good Roof and Floor of the ſame Rock. Here I ventured to creep in twenty Yards on Knees and Elbows, and might have gone further had of ſundry Colours, as cryſtaline (which are the beſt) red, purple, brown, &c. The firſt are very fine, cut Glaſs two or three Times, and are therefore called Diamonds; Naturaliſts ſuppoſe them to proceed from nitrous Steams, for they are continually of the Shape of cryſtalized Salts of Nitre; ſome are ſmall as wheat Corns, others large as a Child's Finger.

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had I taken to the Belly, for it reaches the firſt River, and in that twenty Yards there went off other two ſmall Caves on the left Hand, but I could not trace them. From the top of the Steps to the Bottom, is twenty nine Yards and a half; from this to the River ſide along a ſand Bank, is forty ſix Yards and a half; here it is twenty Yards broad and ten Yards high; but both Heighth and Breadth contract the River, the firſt not being above half a Yard above Water, the laſt only eight Yards. This firſt River at the Side of the Rock on the left Hand, is only fourteen Inches deep; on the right Hand it is two Yards and a half deep; the Rock ſlopes down within fifteen Inches of the Water, and in a Flood it dips in the River. This River is ſixteen Yards and a half over, the Rock at the far ſide is about four Inches higher; but go three Yards beyond and it is two Yards and a half high and nine Yards broad. From the far Side of this River, you either aſcend a very rough ſteep Way on the right Hand to the Chancel, or go ſtraight forward on a Level to the ſecond River, which is forty Yards, at Midway whereof the Cave is forty Yards wide. The ſecond River is three Yards wide, ſeventeen over, four Foot deep; the Entry into it is two Yards and a half high: Or aſcend you on the right Hand from the firſt River, it's thirty five Yards and a half long, the Entry into it is ſix Yards wide: From this Entry to the Level below at the ſecond River, it is twenty Yards and a quarter high, the narroweſt Place in the Chancel is two Yards and a quarter, and from three Yards to four Yards and a quarter high, a very ſmooth Roof with ſeveral Petrefactions, and turns on the top like an Arch. From the Chancel to the Level at the other ſide of the ſecond River is forty two Foot and a half, the far End of the ſecond Water Roof is yet five Foot higher. Beyond the ſecond River is a large high ſtately opening, where are the Petrefactions ſpangling on the Roof and Sides of the Arch, which is twenty Yards high. Then you come to the ſandy Hills and Devils Cellar which are ſixty Yards long, at the far End of which is the ſwallow Mouth, which drinks in the Water that runs along the Cave Side. Then you come to the Arches which are ſeventy Yards long. Then arrive we at a Place ſo high, that no Roof is viſible; thence to the Devils Church and Steeple, ſo go on to *Tom a Lincoln*, and the Figures of other fine Bells all in Arch Work; thence proceed we to the third River, upon which the Rock dipping down there is no further Paſſage. The whole length of this Cave is four hundred eighty Yards.

The Caſtle which gives the Name to the Town, is ſituate on the Top of the riſing Ground, on the South Side of the Town. It is about a hundred Yards higher than the Village, and has either been a Watch Tower, Armory, or Fort, having no Chimneys nor other neceſſary Conveniencies of Habitation: The Wall ſtill remains at its firſt Height, having beſides the Roof two other Floors, each about ſixteen Foot high. Its length on the inſide from Eaſt to Weſt is eight Yards; on the outſide twelve Yards and a half, from North to South eleven Yards and a half on the Outſide, and ſeven on the inſide, with a very narrow ſtone Stair within one Corner of the Wall. It has only one ſmall Room on a Floor, with two ſmall narrow Lights, on each fortified and inacceſſible Side. It is all built of the hardeſt Free-Stone, which muſt have been a Her-

culean

A little below *Pools Hole*, riſe up two Springs, ſaid by *Cambden* and the Authors of the *Magna Britannia*, to be one cold and the other warm, but the Thermometer ſet in the Brook (which is ſix Yards North of thoſe Springs) the Spirits fell one ſixth below the third Inch, the cold Spring brought them down to the ſecond Inch, and that ſaid to be the

culean Labour, firſt to bring them, and then get them up to this Place, there being no ſuch Stone in that Country; its inſide has never been plaiſtered, but only faced with ſmooth Stones, cut a Yard above and below the Lights on each Side, full of antique Figures which I could make nothing of. On the North Side is the Caſtle Yard, in Length from Eaſt to Weſt between two and three hundred Yards, and from North to South about one hundred and fifty. The Caſtle and Yard are ſo fortified on the Eaſt by the Caſtle Cave, over which *Cotton* tells us that *Tom Wilſon* and his Maſter's Mare tumbled: This Cave is a ſmall Streight, ſhut up on both Sides by great Precipices of Limeſtone Rocks, it is open above, and about two hundred Yards broad at the narroweſt Place; at bottom is a moſt charming green Walk, from fifteen to fifty Yards wide, and half a Mile long; from the Top of the Torr before the Caſtle Gate, is about ſixty Yards high; on the Weſt Side it is fortified by that ſhocking Torr over the Entry into *Peaks* Hole. On the North Side has formerly been another inacceſſible Rock, but is now covered with Earth, and the Ruines of the Caſtle Yard Wall. On the South Side was the Entry into the Caſtle by a Draw-Bridge over a deep Gulf cut out of the Rock, acceſſible only by a ſmall Iſthmus from the Mountain above. This Place before the Invention and uſe of Gunpowder, has certainly been the moſt impregnable Fort Man could wiſh or Wit contrive.

Mamtorr ſtands upon the right Hand from *Caſtleton* to *Buxton* about a Mile: On the Top of this high Mountain are the remains of an ancient *Roman* Camp with a double Trench; the fore or eaſt Part of this Precipice is a frightful Torr; on its weſt or back Part is *Adyn-Torr*, the continual mouldering of which has carried off a large Piece of the Trenches on that Side, as perhaps they never met on the foreſide. The Camp ſeems to have been pretty near a Pentagon Figure, whereof remains to this Day one thouſand one hundred and ſeventy Yards, beſides what is decayed and fallen down; ſo that ſuppoſing it to have been whole, it has not been leſs than one thouſand ſix hundred and fifty Yards in Circumference. The inner Trench is about fifteen Yards below the Summit of the Hill, on the very top whereof are two fine Mounts about three Yards higher. It is ſo contrived that it is impoſſible for ſo much as one Man to riſe the Hill undiſcovered, and far leſs any flying Scouts or ſtraggling Plunderers to come from any Part to ſurprize the Entrenchment undetected. This Mountain overtops the whole Country, commands a Proſpect over the whole *Peak* Country, and into *Staffordſhire*, ſome Parts of *Yorkſhire*, *Cheſhire* and *Lancaſhire*. Its Top is covered with Corn-Mould two Yards deep, then Clay three fourths of a Yard; after that a Bed of Shale and a Row of Iron-Stone, in their turns, for about twenty Yards lower; but the Iron-Stone Bed is ſtill the thickeſt, being often a Yard, and the other not half ſo much; then begins an intermixture of Shale, and a mixt Stone between Iron-Stone and Greet-Stone in Beds of the ſame Thickneſs, which continues ſo to the Foot of the Torr. We are to obſerve in this Precipice, that theſe *Strata* lie all Horizontal from North to South, its different *Strata* lying in ſuch exact Order as tho' it were the Wall of ſome pompous Edifice: In the upper Part it is perpendicular, but in the middle it ſhelves or ſlopes, ſo as three ſtrong conceited Youths in ſundry Ages, have attempted and with imminent Danger climbed it. Its Height the warm Spring, which is ten Yards diſtant from the cold, raiſed the Spirits three Eighths above the ſecond Inch; ſo that without a Thermometer it is impoſſible to diſcover any Difference between thoſe two, and both are colder than the Brook in *March*.

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Height from the Top to the Foot of the bare Rocks, is about one hundred and ninety ſix Yards, and from this to *Caſtleton*, we may gueſs at two hundred Yards more; on the Top of all it is about ſixty Yards broad, at the Bottom of the running Shale it is about four hundred Yards broad; it is daily mouldering down by the Wind, for Shale expoſed to the Air for a few Days crumbles into very thin broad Pieces, ſo as the Wind has carried up and covered the Top of the Mountain with it. It is as different from Slate, as Sparr and Diamonds, for it corrodes and deſtroys all Minerals near it except Iron or Coal, of whoſe Vitriol it partakes, and has no Solidity to be wrought upon. The above Trench runs from the North ſide of *Mamtorr* along the South Side of the Hill, North of *Caſtleton*; then it turns South, croſſes the Valley, falls in below the Town, takes it and the Caſtle in, then turns Weſt, ſo goes up to *Mamtorr*, its whole Circumference being about ſeven Miles. Hence it is plain that *Cambden* and his Copiers the Authors of the *Magna Britannia*, who make themſelves merry with this Caſtle, have never ſeen it; here being a peice of the greateſt Curioſity and Antiquity of any in the County.

A Mile South of *Mamtorr*, and four Miles Eaſt of *Buxton*, is that terrible perpendicular Gulf or Chaſm, *Eldine Hole*, which I tried to plumb at ſeven different Stations, at ſix whereof I could only reach one hundred and ninety two Yards, from the ſeventh I plumbed it ſeveral Times and could only get two hundred and ninety five Yards down, about forty whereof ſeemed to be in Water. The Figure of this Place is exactly that of the *Foſſa Magna*, being forty Yards long above ground, and ten over at its broadeſt; forty Yards from the Day begins the Mouth of the Chaſm, not above four Yards long and one and a half broad: About eight Yards below this Grip on the left hand opens a moſt diſmal and frightful Cave, where one no ſooner enters than he ſeems loſt in a ſpacious boundleſs ſubterraneous Abyſs of both Space and Horror which I want Words to expreſs, and no doubt theſe again communicate with others: Some have imagined that the ſureſt Way of fathoming this Emblem of Hell, is by the Sound of any Weighty Body thrown into it. Three Stones therefore being let fall perpendicularly into *Eldine Hole*, the reaching of the Sound from the delivery to the Ear, was 9″. 11″. 10″. Dr. *Halley* ſays, that heavy Bodies near the Earth fall 16*f*.$\frac{1}{12}$ in one ſecond. The Meaſure of Sound in one Second is 1142 Feet. To find the Depth of the Hole put $a = 1273 f.$ $b = 8''\frac{8}{10}$ $d = 1''\frac{2}{10}$ $s = 10''$ $x = 1266,\ 36$. Sir *Iſaac Newton's* Theorem

$$x = \frac{adt + ab^2}{d2} - \frac{\frac{ab}{2}}{2d^2}\sqrt{b2+4dt}$$

1. $adt = 1273 \times 1.2 + 10 = 15276.$

2. $\frac{ab^2}{2} = 636.5 \times 77.44 = 49290.56.$

3. $d^2 = 1.44.$ 4. $\frac{adt + \frac{ab^2}{2}}{d2} = \frac{64566.56}{1.44} = 44831.$ 5. $ab = 11202.4.$ 6. $2d^2 = \overline{288} = 3889.7.$ 7. $b^2 = 77.44.$ 8. $4dt = 48.$

9. $\sqrt{b^2+4dt} = \sqrt{125}\ 44 = 11.2.$

10. $\frac{\frac{ab}{2}}{2d^2}\sqrt{b^2+4dt} = 43564.64.$

11. $\frac{adt + ab^2}{d^2} - \frac{\frac{ab}{2}}{2d^2}\sqrt{b^2+4dt} = 44831 - 43564.64 = x.$ 12. $x = 1266.36.$ and $1266.36 - 1265.82 = \frac{54}{100}.$

Hence from a compound Equation of the deſcending Body and aſcending Sound, we trace it little more than 1266 Feet, or 422 Yards deep.

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In the Coal Pits, a Mile and a half South Weſt of *Buxton*, the *Strata* of Earth lie thus, firſt Peat Moſs, then blue Clay, then Shale full of Marcaſites of Iron, and Iron-Stone, then ſundry Beds of Iron-Stone, laſt of all a Seam of Coal five Foot thick, mixt with much Sulphur and Braſil, ſeveral Lumps of Ocre and Rubric; this Seam of Coal dips a Yard in three; its upper Part is very ſoft and flaky, fit only for burning of Limeſtone; its loweſt Part is harder, tho' ſtill a very indif-

It is not likely that all theſe Caverns in this Country owe their original to the Springs which have their Current through them, by the Waters forcing its Way through the horizontal Fiſſures of the *Strata*, and carrying the looſe Earth away with it, and the looſe Stones falling down. For 1. *Eldine Hole* which is a perpendicular, and the lateral Caves going from it which are dry, are againſt this Sentiment. 2. *Bamforth Hole* under *Charles*'s-*Torr* (of which afterwards) is all horizontal, yet dry, except ſome drops of Water from its Roof in ſome Places. Nor could any Current of Water ever poſſibly come at it, lying high up in an Iſthmus betwixt two low Vales watered with Brooks. 3. If they were owing to the Springs which have their Current through them, they muſt have been made ſome time, and by Degrees, not all waſhed down at once; but we find no Veſtiges of Tradition that ever they were leſs, or the Levels higher and Roof lower than they are, and yet we ſee *Peaks Hole* is far from a Level, there is Room and Earth enough for the Water ſtill to work upon. The Limeſtone Mountains of the *Peak* are full of thoſe Caves, like Coney-Burrows, tho' not known nor viſible, which is evident from thoſe many Shakes of the Earth, ſo called by the Inhabitants, which are Depreſſions where the Earth is ſunk down directly ſome Feet or Yards deep, as tho' it were from an Earthquake. The Cauſe of theſe Shakes I had an Opportunity to know, and it is this: When the ſubterraneous Paſſage, which carries off the circulating Water from thoſe inviſible Caverns is plugged up, ſo that its vent is irrecoverably ſtopt, Water being an incompreſſible Body, its Weight and Preſſure on every Side, eſpecially when the Weight of ſeveral Columns of Water of different Lengths are added to it and the Cave full, the prodigious preſſure muſt and will force ſome vent, but the Water having lifted up the Earth above it, when once the firſt has got vent, the laſt ſubſides; but if this pent up Flood happens to make its Way through the Surface of the Earth in an inhabited Place, diſmal are its Effects, as was fatally felt by moſt of the Inhabitants of *Kettlewell* and *Scarburton* in the Year 1686, when the Side of a great Limeſtone Hill over the Town burſt, and with incredible Force threw out ſuch prodigious Quantities of Water as demoliſhed ſeveral Houſes, carried off the very Walls and Stones, drowned moſt of the Inhabitants, and filled the Meadows with Stone and Gravel. Another ſuch frightful Accident happened near *Dent* in the ſame Weſt riding of *Yorkſhire*, about fifteen Years ago in the midſt of a very dry ſummer Seaſon, but the Water burſting the Mountain in a waſte Place the Flood did no Miſchief, tho' it roſe up the Height of an ordinary Church Steeple: it is alſo remarkable that theſe Shakes and Caverns are in the drieſt hardeſt Places, as I have obſerved in ſeveral of them in *Derbyſhire*. There being nothing remarkable in the ebbing and flowing Well, beſides its ſecret Supply with great Quantities of Water which it throws out in ſudden Gluts at uncertain Times, even ſeveral Times in an Hour after great Rains, and not once a Week in dry Weather, I have therefore omitted it. It is hereby evident however, that it has no Communication with the Sea, nor its Flux and Reflux.

ferent Coal, which melts on the Fire and cruzzles, ſometimes a Vein of Lead an Inch thick croſſes the Coal. It is more beautiful than other Ore, ſparkles like fined Silver, but bring it to the ſmelting Furnace, and you have little beſides Sulphur; the Acid of the Coal having conſumed the Lead till it reach its kindly Soil the Lime-Stone and Greetſtone below the Coal. Fifty Yards from the Day, is a ſtrong thick Bed of blue Clay, whoſe upper Part is a deep Ocre or reddiſh Colour, full of black Lumps like ruſty Iron, which put into *Aqua fortis*, raiſe neither Heat nor Fermentation, but in a little while ſeveral ſmall Bubbles riſe, and the Liquor turns green, which is the Copper diſſolved; all the Water in the Coal Pits is very cold, nor can Lime Stone and Coal conſiſt together.

The *Strata* of Earths in the Lead-Mines next to *Buxton*, are, firſt a thick ſet fine Turf a Foot and a half deep; then betwixt a Sand and a red Clay, or a reddiſh ſandy Clay or a hard Soil, half a Yard thick; thirdly, brown Clay from half a Yard to two Yards thick; fourthly, fine white Sand half a Yard thick; fifthly, a very hard Rock of white Lime-ſtone two Fathoms thick; ſixthly, a redder Sand from ten to twenty Fathoms, this is of a hard Subſtance and accompanies the Ore; ſeventhly, a black Lime-Stone from ſix to eight Yards thick: Then they come to the ſame Sand as before, if there is Ore; but if no Ore, there is a reddiſh yellow Bed of Clay, of the Nature of Marle. Purſue this through the Clay, and they come to a yellow Sand with Ore. Theſe *Strata* lying in ſeveral Degrees of thickneſs, are from ſixteen to eighty Fathoms deep; here is very much white Spar, but none of the green nor yellow; it breaks into Rhomboids. If this be without Lime-Stone, there is very little or no Ore: But if under the Lime-Stone Clay appears, the Vein is ſaid to be out, and there remain no more hopes of Ore, except they ſoon find the Lime-Stone again below the Clay. Moſt of the Ore lies in Cauke-Stone three or four Foot thick. Here is very little Shale or Braſil; where a Chink happens between the Greet-Stone and Lime-Stone, it is filled up with Petrefactions between a yellow and a white Colour, and very hard, as Spar. The Workmen afraid of Damps, are always well provided with Drifts or Levels, that they may be ſupplied with freſh Air, which cauſing a free Ventilation, prevents both the Stagnation of the Air, and a Collection of Sulphur which might be fired with the Candles. The Lime-Stone in working ſmells ſtrong of Sulphur, and their Blaſts (which are Bores made in the Stones, filled with Powder and blown up) being ſo very ſtrong of Sulphur, extinguiſhes the Smell of the Gunpowder. They have here Spar Ore and Cauke Ore, the laſt is much the richeſt. In digging for

Stone near the warm Waters, you find ſeveral ſurprizing Maſſes of mixt Minerals, as tho' they had been artfully melted together, as of Lime-Stone, Iron-Stone and Copper Ore, of Sulphur, Iron Ocre; of Lead-Ore, Iron Sulphur and Lime-Stone, *&c.*

The Ground all about the warm Springs, and on the ſouth ſide of the River, is very dry fruitful and pleaſant, being a thin warm fertile Mould, lying upon Limeſtone, the Graſs tho' ſhort is very ſweet and fattening: Hence they have the moſt delicious Beef and Mutton, Snow lies a much ſhorter time here than in the lower Country. Here is good ſtore of Hares and Foxes, ſeveral wild Rabbets of the Rocks, Partridges, Moor game of two Sorts, one a large black Cock weighing five Pounds a Piece, the other a brown and much leſs, tho' more plentiful; at ſeven Miles diſtance are many Pheaſants. The ſmall River which runs from Weſt to Eaſt abounds with fine Trout, Grellin, Cray-Fiſh, and Silver Eels. And Mr. *Taylor* of the Hall, upon his own Expences, keeps a very good pack of Hounds, for Gentlemens Diverſion, as alſo a pleaſant warm Bowling Green planted about with large Sycamore Trees; and in the Houſe a fine *Engliſh* and *French* Billiard Table. A little Eaſt of St. *Annes* Well, over the Ditch or Level which carries the warm Water from the *Bath*, is made a curious natural hot Bed, and upon the reſt of this Canal might be made the fineſt Greenhouſe in the Northern Kingdoms; he has alſo taken in ſeveral new Gardens with planting, and ſeveral curious Walks. The Garden Stuff has a peculiar, grateful Flavour; up one pair of Stairs in the Hall is a beautiful dining Room, ſeventeen Yards long, and nineteen Foot Wide, ſeven other entertaining Rooms, eleven lodging Rooms with ſingle Beds and Cloſets, twenty nine other lodging Rooms; this one Houſe affords ſixty Beds for Gentlemen and Ladies, beſides ſuitable Accommodations for their Servants and all other proper and uſeful Offices.

The Air here tho' thin and pure is not near ſo cold as one would imagine, for the Place lies low upon the Lime-Stone, compaſſed with Hills. Here are no Fens, Marſhes, Stagnant Waters nor Pits to infect the Air or load it with their Steams. The Waters are very good being ſtrained through the compact Rocks of ſolid black Lime-Stone, which yields much leſs Stone Powder to the intercurrent Waters than the white. It is a large open Country every Way convenient for Sportſmen.

The firſt Author that wrote on any of the Mineral Waters of *Britain*, was Dr. *William Turner*, Phyſician to the Duke of *Somerſet*, who alſo was the firſt *Engliſh* Writer on Botany. He during his Exile in *Baſil*, for his Religion in the Reign of Queen *Mary*, wrote a Treatiſe on Natural Baths in 1557, and begins with the *Bath* of *Baths* in *England*.

Then fifteen Years after, Dr. *John Jones* a *Welſhman*, who lived at *King's Mede* near *Derby*, wrote on *Buxton* Waters in 1572. [c] He reckons up ſeven or eight warm Springs, ſeveral whereof riſe up into the Bath. It was there he found a hot and cold Spring ſo near together, that he could put one Finger into one, and another Finger of the ſame Hand into the other, but except St. *Annes* Well, he has told us of none of the reſt. *Cambden* will have them to be nine Springs, moſt whereof riſe up in the Bath; he ſays, that ſince the Earl of *Shrewſbury* had lately provided
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[c] The Benefit of the ancient Bathes of *Buckſtones*, which cureth moſt grievous Sickneſs, never before publiſhed, compiled by *John Jones*, Phyſition, at the *Kings Mede* near *Derby*, *Anno Salutis* 1572, *Jan.* 18. *London*, imprinted by *Tho. Eaſt*, and *Henry Middleton*, for *William Jones*, 4*to.* p. 158. *Buckſtones* is Ten Miles from *Chatſworth*, Sixteen from *Cheſterfield*, Sixteen from *Sheffield*, Twenty from *Derby*, Thirty from *Weſtcheſter*, Thirty from *Litchfield*, Thirty from *Stafford*, &c. We cannot tell whence *Buckſtones* is derived, but being *Saxon*, it is probably from the wounded Bucks coming there to drink. *Cottrel* will have one St. *Anne* found in the Well, or the Waters fet from Flood *Jordan*. Natural Baths be thoſe which flow through the Entrails of the Earth, taking their Effect of ſuch Things as they run through, and receive Power by, for many Infirmities moſt available. The chief of theſe Baths, which is the warmer Spring, void in Effect of all Corruption, arguing therefore no great quality of Brimſtone (as in Baths) nor of Alum, as ſome have bruted, for then it ſhould not only be of another Colour, marly Yellow, or ſwarthy Green, but alſo it might ſenſibly be perceived by Taſte. Albeit I acknowledge that *Ariſtotle* affirmeth that there is no ſuch hot Spring without a Mine of Brimſtone; and I think with *Fallopius* and *Savanorola*, none without fiery Heat, altho' the Quantity may differ, for if the Quantity were equal and like to the Minerals in *Bath*, the Heat of as great Force, fortified with like Antiperiſtaſis, and as near the Head, then it ſhould little in that reſpect vary from *Bath*; but *Buckſtones* Bathes, have not the fourth Part of the Heat which the *Bath* of *Bathes* have, nor the other Minerals which be there, for *Buckſtones* is much like, as if a Quart of boyling Water were commixed with a Gallon of cold Water; but *Bathe* is, as if to a Gallon of ſeething Water were put a Quart of cold Water, by reaſon whereof, it attracteth and diſſolveth more ſpeedily, but *Buckſtone*'s more ſweetly, more delicately, more finely, more daintily, and more temperately, not bringing half ſo many grievous Accidents as *Bath* doth, but in proceſs of time very effectually for many Infirmities, moſt commodiouſly reſtraining unnatural Iſſues, and ſtrengthening the feeble Members, aſſiſting the Animal, Natural, and vital Faculties, diſperſing Opilacions and qualifying Griefs. The Well Springs are ſituate in a Valley, hard by a running Brook, and run into it, where at the meeting you may ſenſibly perceive and feel the hot Water on the one ſide of the River, and the cold on the other, notwithſtanding ſo commixed after, that it letteth the River afreſh in the coldeſt Weather, for the Space of a Quarter of a Mile; an Argument of the Power of the Heat of thoſe Springs which be three eſpecially, and thoſe very excellent and beneficial for divers Diſtemperatures, Griefs and Sickneſſes; but there be five or ſix other, altho' not ſo good, but were the cold Springs prevented mixing with them, they would be more excellent, for that the more cold Infirmities might be cured by them, being made more hot, for undoubtedly as mine one Foot ſhould ſtep on the hot Spring,
mine

and beautified the Place with Buildings, the Waters began to be reſorted to again, for their extraordinary Effects, ſo that the Waters had loſt nothing of either their Virtue or Reputation, but had not been ſo much frequented, becauſe Convenience and Accommodations for the Reception and Entertainment of Company were wanting, till *George* Earl of *Shrewſbury* built that Edifice.

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mine other would light on a colder, yea, the one Finger I might put in one, and another in the other, eſpecially in thoſe below; howbeit you may find in any ſome alteration; albeit not ſo much by a great deal. Joyning to the chief Spring, between the River and the Bath, is a very goodly Houſe, four Square, four Stories high, ſo well compact with Houſes of Office beneath, and above, and round about, with a great Chamber, and other goodly Lodgings to the Number of Thirty, that it is and will be a Beauty to behold, and very notable for the Right Honourable and Worſhipful that ſhall need to repair thither, as alſo for others, yea, and the Poor ſhall have Lodging and Beds hard by for their Uſes only. The Baths alſo ſo bravely beautified with Seats round about, and defended from the ambient Air, and Chimneys for Fire to air your Garments, in the Bath ſide, and other Neceſſaries moſt decent. And truly, I ſuppoſe, that if there were for the Sick a Sanctuary, during their abode there, for all Cauſes ſaving Sacrilege, Treaſon, Murther, Burglary, Rape, and Robbing, by the Highway-ſide, with alſo a Licence for the Sick to eat Fleſh at all times, and a *Friday* Market Weekly, and two Fairs Yearly, it ſhould be to the Poſterities not only commodious, but alſo to the Prince great Honour and Gain. It is ſituated in a goodly Seat, and that in an excellent hungry Soil, paſſing Healthy, and in time would grow to be very Wealthy, and the Commons about would be reduced to great Fertility; for the Ground on the one Side is full of Limeſtone, bringing good Grain, on the other, a fine black Mould, and a groſs. Howbeit the Place be ſomewhat Stormy in Winter, yet nothing like *Kerby Kendal* in *Weſtmorland*, nor *Brecknock* in *South-Wales*, nor to *Bodnane* in *Cornwall*, *&c.* all the which be notwithſtanding goodly Towns, and Wealthy, and through Induſtry, made to the State very profitable, as in time, no doubt this would, paſſing them, as you may perceive, a thouſand Parts, in a Commodity, unto the which, out of all Quarters of the World, not without juſt Cauſe, would repair very many, and the rather, a great deal being in this ſort furniſhed to their Benefit with a Phyſician placed continually. By compariſon, this be like the Pepper Bath beſide the Head of the *Rhine*, ſaving that the Pepper Bath ſaith *Munſterus*, continueth ſo long as the ſpringing Herbs and Graſs doth remain in their flouriſhing Force and Virtue; but theſe ſo long as the Matter feeding them, do not fail; and ſurely the Sweetneſs and Pleaſantneſs of the Water of the Bath, ſheweth ſome excellent Ore, rather than either Brimſtone, Alum, Bitumen, Iron, Copper, or any ſuch like, for then it ſhould in drinking be perceived by the Taſte. Albeit true it is, as affirmeth *Galen*, all ſuch hot Baths of ſuch Minerals have force of drying, but in thoſe you find no ſuch ſenſe, but ſo fair, ſo pleaſant, and ſo delectable, that it would ſeem to be a dulce Bath made by Art, rather than by Nature, howbeit the Effects declare Brimſtone to be herein. Sea-water often ſtrained through Sand, becomes ſweet, and ſo may thoſe Waters being ſtrained through the Earth, loſe their Mineral Taſte, but retain great Virtue both manifeſt and hidden; for nothing better and more readily takes away Diſtemperature of Heat or cold active Qualities, or evacuateth

The warm Waters which I have obſerved there at preſent, are, firſt the Bath, which takes in ſeveral warm Springs. Thirty two Yards and a half North Eaſt of it is St. *Anne*'s Well, which is chiefly ſupplied from a Spring on its North Side, riſing out of a Rock of Black-Limeſtone, or baſtard Marble, under a ſhelving Stone laid ſo on purpoſe. Twenty Yards South Eaſt of St. *Anne*'s, in another Cloſe, is a hot and

cuateth by the Pores, the ſuperfluous Humours, than a dulce or pleaſant Bath, or that alſo maintain the Health more, for when as it is by Nature moiſt and moderately hot, by Humidity it humecteth, drieth, ſpronge of Heat. By Heat it heateth Cold cauſed of congealing by moderate cloſeing, thorough drieth, ſtrengtheneth the looſed, as by inſenſible Evacuation, it mundifieth all Parts, the which thing is well proved daily there. Therefore when the Actions or Uſes of the Parts be depraved, diminiſhed, or quite aboliſhed, by any of the aforeſaid Diſtemperatures, properly or accidentally, not mortally, nothing more ſafe, nothing more aptly, nothing more delicately reduceth them to their old and priſtine Activity, than the dulce or delectable Baths or Wells of *Buckſtones*. For the weak Members be as well ſtrengthened by ſuch Medicines as temperately heated above their natural Property, as eaſed of their Grief, by qualifying the Dyſcraſy in any or all of the Parts. And this it doth as well, by reaſon it rarefieth the Parts, provoketh Expiration, and wipeth away Filth, as that it firmeth joyneth, and conſolidateth the looſe, weak and ſevered Subſtance of the ſimple or compound Parts; meaſurably qualifying the overheated Members, and drying ſuch as be over moiſt. Therefore good for all ſuch Diſeaſes as come of overmuch contrary Heat, and for ſuch as come of overmuch cold Moiſture; for cholerick and ſalt Humour parched and compacted together, by which we may gather that it is good for ſuch Rheums, Fevers, Headachs, weak Sinews, old Scabs, Ulcers, Cramps, Numneſs, Itchings, Shrinkings, Ringworms, Apoſthems, Sterility from overmuch Moiſture, much and watery Fluor albus; *Item*, Weak Men that be unfruitful, and for them that have Priapiſmus, and that be parboyled in *Venus* Gulf; for Conſumptions of the Lungs, for ſuch as vomit Blood, Inflammations of the Liver, too much Heat and Stoppage of the Reins, burning of Urine, Strangury, and continual deſire to make Water, Teneſmus, involuntary flowing of the Semen, Hemorrhoides, Piles, overflowing of the Menſes, Hiccup, Vomiting, Obſtructions of the Liver and Spleen, Aſthma, Fluxes of the Milt and Liver, Green-ſickneſs, Morphew, and the Stone; the healthy People in good State long it preſerves. Beſt Drink for the crazed at *Buckſtone*, is middle Ale, neither too new nor too ſtale, not over hopped. Your Fleſh meat ſhall be moſt ordinarily, as follows; Mutton, Veal, Kid, Rabbit, Turky, Capon and Hen, Chicken, Pheaſant, Partridge, Curlew, Cnotwype, Woodcock, Snype, or any other cloven footed Fowls, poached Eggs, or reer roaſted. Theſe Fruits may be uſed, Almonds, Raiſons, Figgs, Pomgranates, Quinces, Wardens, and Cheſnuts roaſted, Rice, Marmalade, green Ginger, or their comfortatives Conſerves, or cordial Confections; or to them that that have cold Diſeaſes, or be of a cold Conſtitution, Wines of theſe kinds may be permitted, as a Cup of Sack and Sugar, if the Diſeaſe forbid it not, or of good Gaſcoigne Wine to them that be lean with Sugar; or white Mamulſies of *Madera*, a Myas of good Ale, a Caudle, or Alebury. Moreover the following Fiſh may be permitted, although Licence be obtained, Trought, Crevis, Bream, Barble, Theuion, Perche, Roche, Bret, Garnet, Whiting, Smelt, Cod, Myllers-Thumb, and cold Spring, both riſing up into the ſame Receptacle. About ſixty three Yards, South and South-Eaſt of St. *Annes*, in the ſame Cloſe with the hot and cold Spring, is *Bingham* Well, ordinarily called Mr. *Leigh*'s Water, a worthy Gentleman ſeven Miles diſtant, who has made this Spring his Favourite for ſeveral Years, and reaped great Benefit by it. A little way Eaſt of this, on the Eaſt Side of a Stone Wall, is another ſmall,

Thumb, Bully-Head, Loch, *&c.* Your Meal will be beſt about ten or eleven a Clock, if you can faſt ſo long; if not, take ſome ſmall Refection before you go into the Bath, or not long after you come out. If you go not to Bed, nor receive any Medicine, your Hour of Supper ſhall be about ſix a Clock; but I would have you uſe no Meat after that Time, nor yet Drink, if you can abſtain. When you come firſt thither, becauſe the Air is far colder and more ſharp, than in any part of the South, ſee that you be always well cloathed and have a good Fire, eſpecially tender People, and ſuch as have been brought up in the South Cities, and they whoſe Pores be open. Albeit the Air be very wholeſome and pure, infected neither with Exhalations of ſtanding Pools and Ditches, nor any peſtilent and evil Air, as iſſueth forth of Ponds, Synckes, Sewers, and Draines, nor with ſuch as comes off hempy Grounds, nor great Mears compaſſed on every Side with the Hills, nor with ſuch as comes out of Houſes fulſomely kept, Slaughter-houſes, and Shambles, all which Airs be hurtful to all Ages, as contrarily that which is pure, as is at *Buckſtones*, is to all moſt profitable; a larger Diet may be uſed here than at the Bath. We will ſomewhat entreate of Exerciſe, every Moving is not an Exerciſe, but that which is vehement, and that which in ſome is vehement, may in others be but an Exerciſe, therefore the End of this Vehement ſhall be alteration of Breath, ſeeing in whom there is no alteration of Breath, it is not to be called Exerciſe. Utility of Exerciſe is double, one to the Evacuations of the Exerciſe, the other to the Conſervation of the State of the Body; for of vehement Moving, three things are obtained, Hardneſs of the Parts through daily Exerciſe, encreaſe of natural Heat, and a ſwift moving of the Breath. By Hardneſs of the Breath they be leſs affected in Labour; by encreaſe of Heat, not only mighty Attraction is cauſed in the Body, but alſo a ſpeedier Alteration, a better Nutrition, and a perfecter Diſtribution into all the Parts, by Benefit whereof the Parts be kept ſoft, and the moiſt be thinned, and the ſmall ways of the Body be kept looſe. And ſeeing Exerciſe helps Digeſtion, it ought not to be uſed when a multitude of raw Meat is contain'd in the Veſſels, leaſt it might bring great danger to the State of good Health, and farther encreaſe the Griefs of the Sick, by augmenting of Juice before it were altered perfectly; ſo that the Exerciſe is beſt which is before Meat, ſeeing the Bodies which be unpure and unpurged of common Excrements, the more you nouriſh them, the more you hurt them. The time for Exerciſe is beſt, when the laſt Days Meat is digeſted with a double Concoction, as well that which is in the Stomach, as that which is in the Veſſels of Blood; for then the time of Meat again draweth nigh, and if you uſe Exerciſe ſooner or later, you ſhall either fill the Body with raw Humours, or encreaſe pale Choler. Your Urine may be a good Note when you are to begin Exerciſe, for if it be like clear running Water, it ſhall ſhew the Juice yet to be raw, but if it be higher than Amber, or between it and Jacynte, yellowiſh or cholique Red, it ſhall ſhew the Juice to be digeſted long before. The Sick can bear but little Exerciſe whether Men or Women, but when the Weather is not ſeaſonable, they may play in different Galleries at *Trall in Madam*. The ſmall, ſlow, hot Spring, which mixes with a beautiful purling cold Spring that riſes up cloſe by it. Another plentiful warm Spring riſes up in the Stream of the Level, that carries the Water from the Bath, this is thirty four Yards Eaſt of St. *Annes.* Four Yards farther Eaſt on the South Side of this Stream, riſe two or three other warm Springs.

The

The ſtronger may uſe Bowles, Cranckes, or Shooting at Garden Butts, or Wind-ball, or Yarn-ball, or Plumbetes, or fine Hullyer, or Bowling, riding in a Coach, Waggon, Chariot, Horſe-litter, or Chair, uſing any of them long, ſhort, or mean, ſlow, ſwift, or mean. After long Travel reſt two or three Days before ye Bathe, get acquainted with the Air, and have Melody, for it refreſhes the Wit, encreaſes the Strength, and Melancholly it puts to flight; let your bathing times be Morning and Evening before Meat, but after your Exerciſe and Purging, when the Sun is a good height, miſty Exhalations gone, the Weather fair, and in the Summer Seaſon, between the beginning of *May*, and latter end of *September*, firſt ſaying the following Prayer on your Knees; but in peſtilential Seaſons, utterly avoid Bathing. You may tarry two or three Hours in the Bath if you pleaſe, if the Diſeaſe require it, and the Body can bear it. When you come out let your Body, eſpecially your Head, be well rubbed and dryed, your Cloaths well aired, and if you muſt go to Bed, put two Bladders of warm Water, one under each Arm-hole, another under the Twiſts, and there ſweat as Strength will bear. This done, dry your Body again, and rub it well all over (howbeit not in every one) untill the Skin be red; but if ſuch Frication be appointed, keep your Bed for two or three Hours after, leſt the ſmall Meatus being opened, a ſudden Alteration may happen, of Nature altogether abhorred. No Medicines ſhould be taken without good Advice of a Phyſician, having obſerved the above Rules, and tarried there fourteen, twenty, or forty Days; when you return home uſe the ſame Meat and Drink for a Month, and be ſure you put down in the Regiſter-Book, kept by the Warden of the Bath, or the Phyſician that ſhall be appointed, your Name, Place of Abode, Day of your coming thither and departure, Condition, Calling, Diſeaſe, and Symptoms, and the Benefit you received, paying according to Cuſtom, a Groat for the Recording. And beſides this, I would have every Yeoman to pay 1 *s.* every Gentleman 3 *s.* every Eſquire 3 *s.* and 4 *d.* every Knight 6 *s.* and 8 *d.* every Lord and Baron 10 *s.* every Viſcount 13 *s.* and 4 *d.* every Earl 20 *s.* every Marqueſs 30 *s.* every Duke 3 *l.* 10 *s.* every Archbiſhop 5 *l.* every Biſhop 40 *s.* every Judge 20 *s.* every Doctor and Serjant at Law 10 *s.* every Counſellor and outter Bariſter 6 *s.* and 8 *d.* every Miniſter 1 *s.* every Ducheſs 40 *s.* every Marchioneſs 20 *s.* every Counteſs 13 *s.* and 4 *d.* every Baroneſs 10 *s.* every Lady 6 *s.* and 8 *d.* every Gentlewoman 2 *s.* and all for the Treaſury of the Bath, to the Uſe of the Poor, that only for help do come hither, the one half, the other to the Phyſician for his Reſidence. If any think this magiſterial impoſing on Peoples Pockets, let them conſider their Abilities, and the ſick Poors Neceſſities, and think whether they do not in idle Paſtimes throw away in vain twice as much yearly; it may entail the Bleſſing of them that are ready to periſh upon you, and will afford a pleaſant After Reflection. God has given you Phyſick for nothing, let the Poor and Afflicted (it may be Members of *Chriſt*) have a little of your Money; it may be the better for your own Health; Heaven might have put you in their room, and you in theirs, then a Supply would have been acceptable to you.

The Prayer.

As thou haſt, moſt merciful Father, of thine infinite Bounty and Grace, given us

Power

The Bath is a large ſtately Arch Room, ten Yards long, five Yards and a half wide, and much of the ſame height. There is a Stone Bench

Power to come to theſe thy Baths (preordinate of thy divine Providence) for the Benefit of us thy dear Creatures : ſo likewiſe rightly we confeſs, that the Breach of thy moſt Holy Laws, which we have too often done, is the very Cauſe that we be ſo vexed, grieved, diſeaſed and enfeebled, as a juſt Croſs for our Miſdeeds, ſeeing that to the third and fourth Generation, thou haſt ſaid thou wilt them viſit, howbeit we hope in thy Mercies, unto the which, as unto a ſafe Anchor (toſſed in this miſerable Maze of worldly Wickedneſs) we certainly truſt, taking comfort of thy heavenly Word, that whom thou chaſtiſeſt thou loveſt, ſo love us good Lord, that we unfeignedly truſting in thy Word, the ſecond Perſon in Trinity, our Redeemer, and calling upon thee in his Name (in one Unity) may be relieved, comforted and eaſed, as thou in thy Word haſt promiſed, (if it be thy moſt gracious Will) of all our Griefs, whether they be inward or outward, in Body or Mind, by the Benefit whereof, all the Atheiſts, Godleſs, and Careleſs of the World, may know thy Power, that from thee cometh Health to all Nations, for from thee cometh all Knowledge how to uſe thy Creatures for our beſt Uſe. Grant therefore, good Lord, the healthful Spirit of Truth, the Holy Ghoſt, to help, aid, and aſſiſt us in all our Afflictions, and to guide thy Miniſters, Nature's Interpreters, Phiſicians, with thy heavenly Health ; that being ſtrengthened by thy Influence, may not only the better Benefit us, and the certainer aſcertain us of thy Gifts here and elſewhere, but alſo the better aid and aſſiſt us, ſeeing they be thine appointed Counſellors, as they whom we cannot be without, as thy living Word teacheth ; ſo then ſtrengthen thoſe Baths, teach them, and aſſiſt us, good Lord, that what is profitable for our Benefit may be here had, they ſhew, we ſeek, find, and obſerve : what hurtful, they may declare and withſtand. This grant, eternal Father, thro' the Blood of the immaculate Lamb *Jeſus Chriſt*, that we departing thence better in Health and Strength, thereby may glorify thee over all the World the more. *To whom, with the Son and the Holy Ghoſt, be all Glory, Praiſe, Dominion, and Power, for ever and ever.* Amen.

God preſerve the Queen's moſt Royal Majeſty, Nobility and Council, and namely *George*, the Mighty Earl of *Shrewſbury*, and the Noble Counteſs *Elizabeth* his Wife, whoſe good Furtherance in theſe Edifices hath not lacked ; with the Right Honourable Lord *Talbot* his Son and Heir, and the Honourable Lady his Wife. Mr. *Guylbart Talbot*, and his moſt Virtuous Wife, his whole Offspring, Family, and all the whole Land. *Amen, Amen.*

Thus I have given the Subſtance of this rare Treatiſe as far as relates to thoſe Waters, wherein we may obſerve, 1. That he was no Stranger to Perſpiration and Circulation, though we would have all the World to be ignorant of them before *Sanctorius* and *Harvey*. 2. That here is not one Word of drinking the Waters, only Bathing. 3. That there having been a Regiſter of the Cures done by this Water, kept by the Bath Warden or Phyſician when preſent ; and our Author having the Opportunity of peruſing theſe Books in compiling this Work, it muſt certainly be of Uſe to us to ſee the Effects of thoſe Waters, by Bathing, in ſundry Caſes and Conſtitutions. 4. That twenty five Years after the Writing of this Book, theſe Waters were ſo much frequented, that in the thirty ninth Year of Queen *Elizabeth*, there was a Clauſe of an Act made, That none reſorting to *Bath* or *Buckſton* Wells ſhould beg, but ſhould have Relief from their Pariſhes, and a Paſs under the Hands of two Juſtices of the Peace, fixing the time of their Return ; nor were they to beg there upon incurring the Penalties of that Act ; whereby we may ſuppoſe that Strollers, Vagabonds and Rogues, had uſed this Excuſe before to cloak their Deſigns.

along one end and ſide of it, for the Bathers to dreſs and undreſs upon; between this and the Bath is a Walk of ſmooth Flagſtones, and at the Corners of the Bath, at each end, are very good Stone Steps or Stairs to go down. The Bottom is paved with fine ſmooth broad Flags; on the Backſide lies a Rock of ſolid black Limeſtone, or a kind of baſtard Marble; the Sides are built with fine poliſhed Freeſtone. The two chief Springs riſe up through this Rock, but ſeveral leſſer Springs riſe up all over the Bath through Chinks in the Rock, and the Seams of the Pavement. Theſe afford plenty of Water, and Strings of great Bubbles, containing a warm Air, and ſulphureous Steam, which dilate themſelves as they riſe up, and the preſſure of the Water diminiſhes. All over the Surface of the Bath, the Water is covered with a moſt beautiful Steam of rarefied Air and Sulphur, making their eſcape by a Motion juſt like ſmall Flies or Midges riſing out of the Water. Over the Bath hang two large Iron Chains for the Bathers to go in and hold by. At the South-eaſt Corner is a Pump ſet down; at the North, or lower end, is a large ſquare Hole in the Foundation of the Houſe Wall, which gives vent to the Water out of this into the outer Bath. Above this Hole, juſt upon the Surface of the Water, are two ſmall Holes in the Wall, whereby this Bath formerly diſcharged it ſelf before the Year 1697, when Mr. *White* brought up a Level from the Brook to the Bottom of the Bath, (above a hundred Yards long) that it might be daily emptied, waſhed, and filled with freſh Water, which could never be done without a Level. He alſo made the outer Bath at the ſame time, where the old Kitchen ſtood, and called it *White*'s Bath, at the lower end of which, he made a Sluice and Shutter to lift up and let down, to let the Water off; he fixed a Pump in the Bath to pump off the cold Springs whilſt the Ladies were in the Bath, but afterwards made a Sough to carry off the cold Springs intirely, that they ſhould not riſe up in the Bath, nor chill its Water. The inner Bath is twenty ſix Foot ſix Inches long, twelve Foot eight Inches and a half broad, and at the lower End four Foot nine Inches deep of Water, and four Foot three Inches at the Head, or South End; they can raiſe the Water near a Foot higher upon occaſion; the outer Bath, tho' walled about, yet is open above; it is ſeventeen Foot long, ten Foot two Inches wide, and four Foot ſixteen Inches deep of Water which comes from the inner Bath. The Sluices of both Baths being opened, and the Water run off, I examined their Dimenſions and Springs; the Sluices being ſhut again, both were full in two Hours and eight Minutes, tho' at preſent one fourth of the Water gets off through other Crannies, made by its perpetual Preſſure and Motion. It is alſo worth Notice, that tho' there is a perpetual Steam and Dew in the *Bath* Room, yet the Iron Links have not ſuffered by Ruſt.

St. *Annes Well* formerly roſe up into a ſtone Baſon, ſhut up within an ancient *Roman* Brickwall a Yard Square within, and a Yard high on three Sides, till Sir *Thomas Delves* built the preſent Arch over it, which is twelve Foot long and twelve Foot broad, ſet round with ſtone Seats on the Inſide; it has a ſtrong Iron Bar running Croſs its Eaſt End or Entry inſtead of a Wall, to keep the Arch firm. In the middle of this Dome the Water Springs up into the middle of a Stone Baſon, two Foot Square above, but three Foot wide below, on the Side next the Brook, from the ſhelving Stone laid over on the North Side above the main Spring; the leſſer Spring riſes up in the Weſt End of this Baſon, it bubbles up conſtantly all over. This Wall is twenty four Yards North of the outer Bath.

Bingham or Mr. *Leighs* Well is a very ſtrong Spring, riſing out of the black Limeſtone in a very dry Ground, ſometimes it throws forth ſix times more Water than at other times. *Octob.* 6, 1732. Having been much Rain both on that and the preceding Day, this Spring threw forth a prodigious Quantity of Water, whoſe Warmth raiſed the Spirits in the Thermometer only four Inches and ſix eights in the Forenoon; but it fell yet half an Inch lower in the Afternoon. But St. *Annes Well* raiſed the Spirits five Inches above *Bingham Well*, but the ſmall Spring beyond the laſt, loſt very little of its Heat. So that *Bingham Well* is rather an uncertain than perennial Spring. But the above two Springs never alter by Viciſſitudes of Weather or Seaſons, nor yet that Spring which riſes up in the Canal from the Bath, all which three boil up with an impetuous Force in large Balls or Bubbles of heated Air, which break on the Surface. I tried theſe Waters with the hydroſtatical Balance, by immerſing the Glaſs Bubble, whoſe Bulk was equal to the Bulk of fifteen Drams and a half of common Water, that is one eighth Part of fifteen Ounces and a half. I found ſeveral Variations, for certainly to try the Weight of Water is the moſt difficult and uncertain Experiment that attends a ſtrict Examination of Waters; it is never a whole Day the ſame exactly, but differs according to the Expanſion or Condenſation of the Air in them, the Quantity of Water contained in the ſubterraneous Chanels, the Rapidity or Slowneſs of its Motion, whereby it brings more or leſs foreign Matters along with it, its Stagnation *&c.* *September* 15 being a very clear hot Day, with a ſmall Breeze of Wind, till two a Clock of the Afternoon, then at three a Clock, Thunder, Lightning and a prodigious hot ſultry Air. St. *Annes* and *Bingham Well* weighed three Grains and a half lighter than the River Water; that is, near twenty nine Grains in a Pint; the Bath was four Grains lighter than theſe, *i. e.* thirty three Grains in a Pint. I put ſome of each of thoſe Waters into three different Glaſſes, ſet them into the Air Pump, exhauſted the Air out of the Receiver, but ſcarce had we the leaſt Bubble, only it was whitiſh, as if a little Flower had been mixt with it, and tho' I made what haſte I could leſt the Water ſhould cool in the Bath Room, yet it weighed two Grains heavier when I had done, *i. e.* ſixteen Grains in a Pint. *March* 17, early in the Morning, being a hard Froſt, ſtrong eaſt Wind, and ſome Hail, I made a freſh Trial, and the *Bath* was ſeven Grains lighter than the River Water, *i. e.* near fifty eight Grains in a Pint. St. *Annes* and *Bingham* were each ſix Grains lighter than the River, *i. e.* about forty nine Grains lighter than common Water, and nine Grains in a Pint heavier than the *Bath.*

April 17, the Air being pretty temperate, the laſt two weighed only four Grains and a half lighter than common Water, *i. e.* thirty ſix Grains in a Pint. I took up a Pot of each of thoſe Waters, and a Pot of common Water, ſet them upon a Table in my lodging Room, tha they might be of an exact Temperature, next Morning all three weighed a grain and a half lighter than common Water, *i. e.* twelve Grains a Piece in a Pint lighter; the laſt taken up, let ſtand till it ſettled, and let fall all its groſſer Parts, then heated to the ſame Degree of Warmth with the Bath were near of the ſame Weight.

As to the Warmth of theſe Waters, I took a Thermometer whoſe Tube was fifteen Inches long, and the Diameter of its Bore was one twenty third of an Inch, and filled it only ſo high with Spirits, that on the fifteenth of *September* (as above) when the Thermometer was ſet in *Buxton* River, the Spirits were two Inches one fourth above the Ball. This Tube ſet in the *Bath* one quarter of an Hour, the Spirits roſe four Inches ſix eighths higher, that is, to ſeven Inches. St. *Annes Well* brought the Spirits down one fourth of an Inch in the Tube, *Bingham Well* brought them ſtill five eighths of an Inch lower. This Evening the Sky cleared again, and all Eaſt, North Eaſt, and North Weſt up to the Zenith was covered with *Auroræ Boreales* or Streamers, the Air very calm: Next Morning a ſmall Froſt, the Spirits in the Thermometer were only one Inch above the Ball, that is, one Inch and one fourth lower in the Tube than they were the Day before; I ſet the Thermometer in the *Bath* Room half an Hour, the Steam raiſed the Spirits one Inch ſeven eighths higher; then I ſet them in the *Bath* thirty five Minutes, and they mounted up to the ſame Height they were the Day before. *December* 27, 1731. being perhaps the coldeſt Day that has been in *England* this Age; a ſtrong North Wind and a clear violent Froſt, which in ſeven Hours time bore Horſe and Rider, tho' it rained and ſnowed the Night before till two a Clock in the Morning. The Spirits in the common Thermometers were at exceſſive Cold, tho' the Glaſs I obſerved hung in a Stair Caſe between two Rooms with continual great Fires, and the Door of one Room never ſhut, nor was there any outer Door near. The Spirits in my ſmall Thermometer were more within the Ball than would fill an Inch of the Tube: Both Thermometers ſet in a Pitcher of River Water that Moment taken up where the River was moſt frozen, the Spirits in the firſt Thermometer preſently roſe ſix Minutes or Degrees, thoſe in mine juſt filled the Ball. Three fourths of a Pint of boiling Water put to three Pints of this River Water, raiſed the Spirits in my Thermometer to the exact Height that *Buxton* River did *September* 15; and one Pint and a quarter more boiling Water added brought it juſt to the Warmth of *Buxton* Bath: That is, it raiſed the Spirits in the Thermometer to the very ſame Height. So I take theſe two for the great Extreams of Cold and Heat, all the reſt being intermediate Degrees. *January* 10, being cloudy Weather, ſharp Froſt and ſome Snow, the Spirits in my Thermometer filled not the Ball; I put it into *Bingham Well*, and the Spirits roſe a little above the ſixth Inch, removed thence into St. *Annes well*, they aſcended one eighth above the ſeventh Inch, carried from thence and ſet in the Bath, they roſe to ſeven Inches five eighths and there ſtopt. *May* 27, being a very ſtormy Day with a raging Wind and great Rain, I tried two new Thermometers with freſh Spirits, the Bore of the larger Tube was one twenty third of an Inch, that of the leſſer was one twenty ſeventh of an Inch, I put both in the River which was then in a Flood, the Spirits in the ſmaller were hid within the Ball, thoſe in the larger were one Inch and three eighths above the Ball; I removed both into the ſmall Spring beyond *Bingham Well*, the Spirits in the ſmall Tube roſe eight Inches, and thoſe in the larger Bore ſeven Inches, that is, to eight Inches three eighths; both taken out here and put in *Bingham Well*, the Spirits in the ſmaller Bore got up to eleven Inches, and in the other to nine Inches; both carried and ſet in St. *Annes Well*, the firſt roſe to fourteen Inches five eighths; both put into the Spring beyond the hot Bed, which riſes up in the Level that carries the Water from the Bath, the Spirits in both Thermometers roſe one eighth higher: I carried them thence and ſet them in the Bath, the ſmall Bore roſe to fourteen Inches three eighths; with this laſt I ſtript and went into the Bath, and put it upon the Spring at bottom next the Pump, and it roſe to fourteen and a half; then I removed it into the ſecond Spring, which riſes out of the black Rock, and it yet aſcended one ſixth of an Inch higher; but here the Tube being but ſixteen Inches long, the Air above the Spirits was compreſſed into ſo narrow a Compaſs, that its Reſiſtance was too forcible for the Aſcent of the Spirits. Then I ſuſpended the Spirits upon the Surface of the Bath, and the Spirits fell down to fourteen Inches one tenth; ſo that when the Bath is full, the ſecond Spring is one hundred and ſeventeenth Part warmer than the firſt, even in this whole mixture of Water, and the bottom of the Bath is one fifty ſixth Part warmer than the Surface. It is pleaſantly ſurprizing to ſtand in the full Bath, and ſee the Exhalation of the compreſſed and rarefied Air, and ſulphureous Steam, continually playing on the Waters Surface; like the Tranſition of the fiery Particles in ſcalding Water before it boil and is calm and clear, or juſt as if a Cloud of ſmall Flies were riſing up, whoſe Feet raiſed a ſmall but general turbid Motion on the Top of the Water; common Water made of the ſame Warmth with the Bath, the firſt thirty Minutes the Water cooled faſter than the Bath by one hundred and twelfth Part, but then the Bath Water cooled ſooner by one hundred and eleventh Part.

Neither Dr. *Liſter*, Sir *John Floyer*, Dr. *Leigh*, nor *Allen*, [a] in their treating of theſe Waters, have once attempted to give us the Quantity of Water theſe Springs throw out in any given Time; this I endeavoured to ſatisfy my ſelf in, and I find it as follows: St. *Annes Well* throws out three hundred and ninety Gallons of Water in an Hour, or nine thouſand three hundred and ſixty Gallons in a natural Day and Night, or three Millions four hundred ſixteen thouſand and four hundred Gallons in a Year, twenty four Quarts of this Water exhaled in Winter left ſeven Scruples of Sediment; ſix Quarts of it exhaled in *May* left thirty five Grains of Sediment, ſeventy of the firſt was Earth, the reſt a very beautiful white Salt; nineteen of the laſt was Salt, the reſt Earth: So that the Proportion of Sediment to the Water, is near as one to two thouſand five hundred and ſixty; the Proportion of Salt to the Water (allowing one half Salt and the other Earth, which, upon repeated Tryals, I have found pretty near the Truth) is as one to five thouſand one hundred and twenty, or a little more. Now three Millions four hundred ſixteen thouſand and four hundred divided by two thouſand five hundred and ſixty, the Proportion of Sediment to the Water, then this Spring throws forth in one Year ſix hundred

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[a] Dr. *Liſter de Aq. Medicat. Angl. exercit. prior* p. 35. ſays we have warm Baths in *Derbyſhire* called *Buxton Wells*, which he had ſeen, and they are tepid Waters. It is a notable Spring and throws forth much Water, it is arched over for the more convenient Bathing. At firſt going into the Bath Room the Air ſeems very warm, and except the Windows be kept open all Day, one would find it uneaſy to bear the Heat of the Place; there is a conſtant Steam ſitting upon the Surface of the Water, and that even at the Summer Solſtice at the Place where the Bath diſcharges it ſelf. The Water ſeems Warm to none at firſt going in, but in a few Minutes you wonder, that you did not perceive it warm before; it ſooths all the Members of the Body with ſuch a pleaſant tepid Heat. If you put your bare Foot into the Water as it bubbles up, you will find it manifeſtly tepid, it ſmoaks ſtrongly moſt Part of the Year, eſpecially in Winter. There are ſome other tepid Springs beſides the Bath, whereof one is St. *Annes Well*, which is the drinking Water; if you ſwill down much of it, it vomits. Theſe riſe out of a black Limeſtone under which is Pit Coal. Theſe Springs are very clear, and ſcarce depoſite any Clay or Earth, and tho' they are not of the atramentous Kind, yet they plainly taſte of Iron. Out of four Gallons of each Spring exhaled, he had ſcarce a Scruple or two of Salt, without any ſtony Parts; this cryſtalized into common Salt chiefly, among which were interſperſed ſome few cryſtals of Lime-Stone, p. 134. Theſe Waters are very wholeſome for Bathing in, for they warm the Blood and other Humours, cauſe Sweat, move the Belly, and are diuretic. If their Uſe is too long continued, from their Effects the following Symptoms neceſſarily follow, *viz.* Leanneſs, Thirſt, Weakneſs of the Bowels, eſpecially of the Stomach. Both I and others, weak and ſtrong,

ſtrong, obſerv'd this peculiar to thoſe Waters, *in Balneo immerſi mingendi Cupiditate ſæpius teneri, immo involuntariè ſæpius mingere, puta quater minimum aut pluries, intra dimidium Horæ*; the ſame Effect he found in the Bath Waters. Thus far he; and you ſee how cautious he is that he run not out in the Commendation of this or any other Mineral Water, tho' he ſays moſt of its praiſe.

Dr. *Leigh* Book i. p. 31. *&c.* tells us that the warm Waters at *Buxton* riſe out of a Baſs; they are ſulphureous and ſaline, yet not fœtid, very palatable, becauſe the Sulphur of thoſe Waters is not united to Vitriol. It tinges not Silver nor is purgative, by reaſon its ſaline Parts are diſperſed in ſuch ſmall Proportion, which ſaline Particles make up a compound Salt, conſtituted of marine Salt, and the *Sal Catharticum Amarum*, which the *Nitrum Calcarium* that impregnates *Epſom*, *Northall*, *Dulwich*, and the other purging Waters of thoſe Parts. Theſe Waters drunk create a good Appetite, open obſtructions, and no doubt, if mixed with the chalybeate Waters that are there, may anſwer all the Intentions of the Bath Waters in *Somerſetſhire*, and that of St. *Vincents* near *Briſtol*, ſo noted for curing a *Diabetes*, of which I have ſeen ſeveral Inſtances in theſe Parts; and likewiſe for curing of bloody Urine ariſing from the Weakneſs of the urinary Veſſels, of which he ſaw a moſt noted Inſtance in *Liverpole*. This Bath is of a temperate Heat, and without Queſtion by reverberating the *Halitus*, might be brought to any Degree of Heat. But I think in its own natural Heat, it may in general be ſaid to be more agreeable to the Conſtitutions of thoſe Parts, and where the hot Baths cannot be ſafely uſed this may; he was Witneſs the Summer before to its ſurprizing Effects in ſcorbutic Rheumatiſms, in Perſons that could not go before without the Help of Crutches, who came from thence to *Mancheſter* on Foot without them, *viz.* ſixteen Miles. Where ſulphur Waters tinge a copper Colour, it is from the Addition of a vitriolic Salt, as *Harrigate*, other ſulphur Waters tinge Silver of a golden or yellowiſh Colour, as the Bath in *Somerſetſhire*, there is a greater Proportion of ſulphur and little Vitriol: But if they tinge none at all, it is all Sulphur and no Vitriol, as *Buxton*.

and ſeventy one Gallons of Salt, and as much ſtone Powder, which added together, make thirteen hundred and forty two Gallons of Sediment in a Year.

The inner Bath is twenty ſix Foot, ſix Inches and a half long, twelve Foot eight Inches and a half broad, and four Foot ſix Inches deep of Water; the outer Bath is ſeventeen Foot long, ten Foot two Inches broad, and five Foot ſix Inches deep. Then the inner Bath contains one thouſand five hundred and ſeventeen cubical Feet of Water, and near ſeven eighths of a Foot; and the outer Bath nine hundred and twenty one ſolid Feet, and three fourths; both added together, make two thouſand four hundred and thirty nine, and $\frac{62}{100}$ cubical Feet of Water; but ſuppoſing a cubical Foot of Water to contain about $7=48$ Wine Gallons, and the Springs of the inner Bath affording Water for both, and both being filled in two Hours eight Minutes (let us allow the eight Minutes for the loſt or waſte Water which yet is too little by much) then the Springs of the inner Bath throw out in two Hours, eighteen thouſand two hundred and forty nine $\frac{68}{100}$ Gallons of Water; Six Gallons of which I exhaled, and it left ſix Scruples of Sediment, that is, one Scruple to a Gallon, or forty ſeven Pound eight Ounces and three Drams of Sediment in two Hours, two Parts whereof being Earth, then ſtone Powder thrown out in that Water in the foreſaid Time is thirty one Pound eleven Ounces forty Grains, the Salt is fifteen Pound thirteen Ounces four Drams and twenty Grains. The Water thrown up by this Bath in a Year (ſeeing its Springs are always of the ſame Speed) is ſeventy nine Millions, nine hundred and thirty thouſand, ſix hundred and twenty Gallons (multiplying two by twelve the number of Hours in a Day, and that by three hundred and ſixty five, omitting the Fractions of Water and Sediment) the fixt Parts whereof are two hundred eighty thouſand ſeven hundred and eighty Pound, eleven Ounces and ſeven Drams, one third of which being Salt amounts to ſixty nine thouſand five hundred and ninety three Pound ſeven Ounces and one Dram in a Year.

When the old *Earl of Shrewſbury*'s Building was demoliſhed about ſixty Years ago, and a new Edifice erected by the then *Earl of Devonſhire*, this Bath ſuffered two irreparable Loſſes of its greateſt Ornaments, *viz.* The Regiſters, wherein were written and preſerved for ſome Hundreds of Years, an Account of the moſt remarkable Cures, whether inward or outward, put down and ſigned by the cured or eaſed Patient, or written by the attending Phyſician, or in his abſence by the Bath Keeper, and ſubſcribed by the Perſons own Hand; for an Account of the Diſeaſes however we are indebted to Dr. *Jones*, who peruſed

uſed the Regiſters when extant, which were of Service to him in compoſing his Work. The other noble and beautiful Piece of Furniture loſt, were the many Rows of Crutches left hanging in two large Rooms, as the laſting Monuments of the happy Delivery of ſo many lame, halting, pained, and tortured Wretches, by the Uſe of this bountiful Largeſs of Heaven. Is it poſſible that wiſe or thinking Men ſhould be the Deſtroyers of thoſe? for had they built State Rooms of the fineſt Marble, overlaid them with Gold, ſet with Rows of the richeſt ſparkling Diamonds, and had their Floors painted by the moſt maſterly Hands, in the fineſt durable Colours, with the lively and true Emblems of the moſt diſtant, dark and valuable Hiſtories, and had their Tables abounded with the Luxury of *Heliogabalus*, yet were all this but paltry Stuff to ſick People, in compariſon of the others. What mean Cordials were theſe tawdry glittering Materials to the afflicted, pained or lame, in compariſon of ſeeing at his firſt Entry, ſo many Trophies of Victory? And let them ſtep but a little further, and ſee a Shelf moſt beautifully adorned with faithful Narratives, containing an Account by our antient, honeſt, undeſigning Anceſtors, of thouſands of Cures done in their very Diſeaſes, with the ſundry Methods purſued, and the various Effects. Only Ignorance or Envy could prompt to the Havock of that, which no Place in *Britain*, or perhaps in *Europe* beſides, had to glory in, and ſhow in ſuch Plenty [e].

Bingham Well affords an uncertain Stream, being ſometimes higher, ſometimes lower; but when I examined it in a great Drought, it diſcharged ſeventeen Hundred and fifty eight Gallons of Water in an Hour. Six Quarts of this Water exhaled, left thirty three Grains of Sediment, twenty whereof was Salt. Then this Spring ſends out thirteen Millions, ſix Hundred and forty ſeven Thouſand, one Hundred, and eighty Gallons of Water in a Year, which carries in it forty eight Thouſand three Hundred and ſixty eight Pound of fixt Sediment, near two thirds of which being Salt, it affords thirty two Thouſand two Hundred forty five Pound, five Ounces, two Drams, and two Scruples; the reſt is

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[e] Tho' the Bath in *Somerſetſhire* be now very much frequented, and juſtly arrived at great Fame and Grandeur, yet if we look back to Dr. *Turner*'s Time, who wrote only fifteen Years before Dr. *Jones*, and publiſhed his Book ten Years ſooner, we ſhall find from the poor Circumſtances and Obſcurity it was in then, that *Buxton* had the Advantage of it. In his Preface he ſays, I have written ſo well as I can of the Bath of *Bath* in *England*.

Whereof that I wote of no Man hath written one Word, that ever I could read, and *p.* 1. he thus begins, " Although there " be a very excellent and wholeſome Bath " within the Realm of *England*, yet for all " that, I reckon that there are many in the " North, and North-weſt Parts of *England*, " and is Earth, beſide a Fragment of twelve Ounces and a half of Sediment. The little Well of warm Water, thirteen Yards Eaſt of *Bingham* Well affords Seventy eight Gallons and a half of warm Water in an Hour, or ſix Hundred eighty ſeven Thouſand, ſix Hundred and Sixty in a Year.

All theſe four warm Springs together throw forth in a Year ninety ſeven Millions ſix Hundred and eighty one Thouſand eight Hundred and ſixty Gallons of Water, beſides the waſte Water that gets out of the Bath, and the ſtrong Spring riſing up in the Middle of the Bath Level beyond St. *Annes* Well, and the warm Water which riſes up in the hot and cold Spring, and laſtly the two ſmall warm Springs which riſe up in the low Ground, between the hot and cold Spring, and the large Spring in the Sough, with ſeveral other ouzings of warm Water in ſundry other Places, the whole added together will be near double this Computation.

All theſe Waters brighten the Solution of Gold, and firſt make the Solution of Silver white, then turbid, after which it lets fall a large white Sediment. They turn Solution of Iron and Mercury yellow. Solution of Sublimate turns them firſt of a ſmall Pearl, clear, and by long ſtanding, muddy, and blackiſh. They preſently become white by Solution of Sugar of Lead, then let fall a large Sediment. Oil of Tartar makes them firſt of a blueiſh White, and in one Night and Day

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“ and ſome in the Eaſt Parts, which being diſeaſed with ſore Diſeaſes, would gladly come to the Bath of *Bath*, if they knew that there were any there, whereby they might be holpen, and yet know not whither there be any in the Realm or no.

He that had been in *Italy* and *Germany*, and had ſeen how coſtly and well favouredly the Baths are trimmed and appointed there in diverſe and ſundry Places, would be aſhamed that any Stranger, which had ſeen the Baths in foreign Lands, ſhould look upon our Baths ; for he would think that the Stranger would accuſe us *Engliſhmen* of three Things : Of Groſſneſs and brutiſh Ignorance, becauſe we trim our Baths no better ; of Unkindneſs, becauſe we do ſo lightly regard ſo high and excellent Gifts of Almighty God ; of beaſtly Filthineſs, becauſe we make no Partition between the Men and the Women whilſt they are Bathing, but ſuffer them contrary both to the Law of God and Man, to go together like unreaſonable Beaſts, to the Deſtruction of both Body and Soul of very many. If there be any liberal Duke, Lord, Knight or Squire, *&c.* that will beſtow any Coſt upon the bettering and amending of thoſe Baths, I for my part having no other Riches, will forward it with my Counſel thus as I can. Let every Bath have a Hole in the Bottom, by which the Bath may be cleanſed and ſcoured every twenty four hours. It were meet that every Bath had a covering above it, *&c.* whereby we ſee their then low State : Though he ſays they had been then known a Thouſand Years, but either thro' the Ignorance or Enviouſneſs of Phyſicians in former times, they would not ſend their Patients whom they could not otherwiſe Cure, to the Bath. For very few in times paſt have been ſent thither by the Advice of Phyſicians.

you have a Sediment of the ſame Colour half an Inch high; Spirit of Vitriol, and the Oils of Salt and Sulphur turn the Water rather clearer and finer, tho' they raiſe a viſible inteſtine Commotion, and the Sides of the Glaſſes hang full of Air Bubbles. Spirits of Hartſhorn or Sal Armoniac change it to a whitiſh clear, and upon twenty four hours ſtanding leave a ſmall Sediment like Wool or Cotton. Syrup of Violets made it firſt blue, then greeniſh. Syrup of Cloves, a whitiſh blue and muddy. Tincture of Fuſtick, of a pale Sack colour. Tincture of Logwood of a beautiful Red. Tincture of Galls of a muddy yellowiſh Colour, which in four Days ſtanding turned Green. Green Tea altered it not. Tincture of red Roſes gave it a Brandy colour. Rum, Brandy, Balauſtian Flowers, Pomegranate Peel, nor Oak Leaves made no Change.

Bingham Well mixt with the foreſaid Ingredients ſeparately in ſundry Glaſſes, and let ſtand all Night; next Morning, that with Solution of Silver, was of a Pearl, clear a-top, and a large Sediment. With Tincture of Rhubarb, of a yellowiſh brown. With Solution of Sublimate, the Liquor was clear, but the Sides and Bottom of the Glaſs were blackiſh. With Spirits of Hartſhorn, of a blueiſh Green. With Tincture of Fuſtick, yellowiſh. With Tincture of Braſil, a light ſmall Red. With Tincture of Logwood, deep reddiſh brown. With Tincture of Galls, a deep purple Scum above, yellowiſh in the middle, and a blewiſh Pearl at top and bottom. With *French* Brandy of a darker clear than common Water.

The Differences between this and St. *Annes* Well were very ſmall, the firſt made Solution of Silver of a bluer white, and afterwards of a more purple Colour than the laſt, it was alſo reddiſh a greater ſpace with Syrup of Cloves; it let fall more Sediment with Solution of Lead; its Sediment left after Exhalation was more pungent and ſaline, and very white. Eleven Quarts of it at another time leaving thirty three Grains of Sediment, twenty four whereof were a white Salt, which changed Syrup of Violets to a beautiful light green Colour, but the Salt of St. *Annes* Well made little Alteration upon it; the firſt alſo turned Solution of Sublimate a little Orange coloured, and mixed with *Sal Armoniac* ſent forth an urinous ſmell. It crackled a little on a red hot Iron, and blebbed not much. It fermented ſtrongly with Acids, but not with Alcalies.

Bingham Well Water being fetched ſixteen Miles, and kept five Nights, I compared it with common Pipe Water which had ſtood two Nights in a leaden Ciſtern. Tincture of Rhubarb turned common Water of a light yellow Colour. *Bingham* Water, of a reddiſh or reddiſh brown. Solution of Sublimate changed not common Water, but occaſioned a Scum over it of red, blue, and yellow, according to the ſundry direction of the Rays of Light. *Bingham* Water became whitiſh, and had a Scum of yellow, red, green, and blue. Oil of Tartar made no Alteration on this common Water, but the other was firſt white, then crudled, and let fall large whiter Flakes at the Sides and Bottom of the Glaſs. The acid Spirits raiſed a greater inteſtine Motion, and more Bubbles in the mineral Water than in the other. Spirits of Hartſhorn had no Effect on the laſt, but changed the other white, which became alſo greener with Syrup of Violets, more than the common Water. After four days longer ſtanding, Tincture of Braſil Wood had turned *Bingham* of a deeper red than the other, and Tincture of Galls, Sumac, *&c.* had changed the firſt Green throughout. Solution of Silver had made it of a light Purple, but the common Water was a pale Pearl.

When I had kept the Bath Water, *Bingham* Well, and the hot and cold Spring Water, till they were at their higheſt degree of Pulvefaction, then with Tincture of nephritick Wood, they were all whitiſh firſt, then pale, laſtly crudled, and became green. The ſecond of theſe with Solution of Silver, Tinctures of Galls and Sumac, was red; Bath Water, with Solution of Silver, was reddiſh, but ſoon changed to a Pearl. With Tincture of Galls, both it and the third, were firſt of a muddy clay Colour, then leaden, covered with a variegated Scum; but the Bath, with Tincture of Sumac, was wholly green in five Days. Syrup of Violets turned *Bingham* Well very green in two Days.

I exhaled each of thoſe Waters ſeveral times, and always found ſome difference in the Quantity of their Sediments, but never of their Kind, the laſt being always the ſame; the firſt varied, ſometimes from the Water, ſometimes the Fire, ſometimes the Veſſel. Not only the Sediment, but the Salts fermented with Oil of Vitriol, they alſo crackled in the Fire, and ſwelled a little; but finally, to be ſatisfied of both their Kind and Proportions, I ſet them to cryſtalize. The Bath afforded both Sea Salt and Nitre, but moſt of the firſt. The Salts of St. *Annes* Well were the ſame, only there was more Nitre than in the Bath. *Bingham* Well contains moſt Nitre of any of them, and leſs marine Salt. I took the Cryſtals of Nitre from the marine Salt, diſſolved them, and ſet them to project into regular Cryſtals, that I might obtain their true Figures, which ſee in the Plates.

From the preceding Hiſtory, we draw theſe Obſervations, *viz.*

1. That tho' there is plenty of Ocre, Ironſtone, and Sulphur in the Coal-pits here, which are generally reputed the Cauſe of hot Springs,

yet the Water is ſo far from warm, that it is intenſely cold. Hence to cauſe Warmth, there muſt either be ſome other Materials, or there is a Mixture of other Ingredients which prevents their Effect in warming the Water; or theſe are mixt in undue Proportions.

2. Again, ſince we find the Veins of Lead croſſing the Coal corroded, it is plain that Vitriol acts upon, and conſumes Lead, as well as other Metals.

3. Since Limeſtone and Coal cannot agree, we ſee that the alcaline Earth of the firſt, is as hurtfull to the Acid of the laſt, as this Acid is prejudicial to Limeſtone; for that it is not the Nitre in the Limeſtone that is hurtful to the Coal appears from this, that moſt of the Chalybeat or Vitriolic Waters contain alſo a fixt Nitre, which exiſt together.

4. Cannot we find good Lead, either where there is diſſolvible Vitriol, as in Coal, or even in a neutral Earth, wherein is much Ocre, or where this *Lapis Calaminaris*, or Copper Ore are? then this ſhews us the Delicacy and Diſſolubility of this Metal, by the ſmalleſt Acids.

5. However homogeneous *Buxton* Waters may appear in all other reſpects beſides their greater Heat, and of the Nature of common Water otherwiſe, yet ſeeing ſeveral of the above tincturing Ingredients, produced in them Phænomena differing from thoſe of common Water, therefore it muſt contain ſome other Principles than thoſe of common Water.

6. Tho' it cannot be denyed that this Water has a Mixture of different Principles, yet ſeeing it is ſtill eight or ten Grains in a Pint lighter when cold than common Water, this ſhews that it has leſs earthy or other groſs Parts in it than River Water.

7. Does common Water made of the ſame Warmth with *Buxton* Bath, cool ſooner at firſt, but ſlower than it toward the latter end? then *Buxton* mineral Water has either leſs groſs foreign Matter in it, or this Matter exiſts in ſmaller Particles in the Water, and gives leſs Reſiſtance to the flying off of the leſs rarified Particles of Heat.

8. Seeing *Buxton* Water is ſo much lighter and warmer than common Water, before it has received any culinary or artificial Fire into its Pores to rarefy its Air, it is plain it brings that along with it which is equal to the fiery Particles in heated Water, which being occaſioned from this Waters waſhing mixtures of ſeveral Minerals, we ſhall therefore call that a Mineral Vapour.

9. Since this Water waſhes ſo many Ingredients abounding with Sulphur, and we find that even groſs Sulphur by the Mediation of Limeſtone communicates ſome of its Parts to Water, and alſo ſeeing

there is conſtantly ſuch a viſible Sulphureous *Halitus* upon the Surface of the Water, then it is reaſonable to think, that this Water, whilſt warm, is impregnated with a Sulphureous Steam or Vapour, as one part of its mineral Spirit.

10. From the whole Proceſſes of Experiments, it is plain that the Minerals warming and impregnating thoſe ſundry Springs are the ſame only differing ſomewhat in the Proportion of their Ingredients.

11. Theſe Minerals lie in a *Stratum* or Bed from Weſt to Eaſt.

12. Since *Bingham* Well increaſes or decreaſes upon viciſſitudes of Weather or Seaſons, then its Spring is not ſupplied from any great Depth in the Earth, but chiefly from the Surface of the Ground and ſmall Hill above, and ſeeing both it and the ſmall warm Spring beyond it (which I have ſeen quite dry) are ſo ſuperficially provided and yet warm, the impregnating Ingredients ſeem not to lie very deep in the Earth.

13. Since theſe Waters continually bring up ſo large and numerous Bubbles with an impetuous Force from the Bowels of the Earth, then muſt their Interſtices be richly ſtored with this fine Air.

14. Seeing St. *Annes* was known to be of the ſame Nature, and threw forth the ſame Quantity of Water before the Bath Level was made that it does ſince. And ſince from this Well to the Bath is a continued Rock of firm black Limeſtone, or between Marble and Limeſtone, eſpecially ſeeing the main Spring which ſupplies this Well, riſes up through a black Limeſtone on that Side next the River, and not on that next the Bath; but finally, ſince we find the two conſiderable differences in its Contents from thoſe of the Bath, it is ridiculous to ſuggeſt that this Spring has any Communication with the Bath.

15. Since there is ſuch difference at ſundry times in the Weight of theſe Waters, it follows that there is no certain Standard for the ſpecific Gravity of theſe Waters, only this in the general, that they are lighter than other common Water; and that the lighter they are, ſo much more impregnated with the Mineral Spirit, and the leſs extraneous Bodies they bring along with them; and the lighter it is, the warmer; and the warmer, the more Medicinal.

16. The more the Pores of the Earth are locked up by Froſt, or filled with Water, ſo as it affect not the Springs, the warmer and lighter is the Water; and the warmer it is, ſo much ſtronger is its mineral Vapour, and therefore the more powerful are its Virtues.

17. Seeing it did bubble in the Air-Pump, not the ſeparability and ſlipperyneſs of its Parts, its freedom from Viſcidity and Tenacity, it not

giving any viſible Reſiſtance to the egreſs of the Air; how fit therefore a Vehicle is it to thin groſs ſizy Humours, or divide the more firm, earthy or ſalt?

Did it weigh heavier after it was taken out of the Air-Pump, even though it in a good Meaſure retained its Warmth? then it muſt have loſt ſome of its Parts, but theſe being neither the Vehicle nor fixt Contents, they muſt therefore be the Air or Spirit.

18. From the Uſe of the Thermometer, we ſee *Firſt*, the different degrees of Heat of the ſundry Waters. *Secondly*, We find that there are different degrees of Heat of the ſame Water in the ſundry Seaſons of the Year, and Temperature of the Air. *Thirdly*, That theſe Waters are not relatively, but abſolutely warmer in Winter than Summer, in Froſt, than freſh Weather, in a cold Seaſon, than hot, the Bath at leeſt being one twentieth part warmer in Froſt or Winter, than in warm Weather. *Fourthly*, That in a great Froſt, four fifths of the coldeſt Water not frozen, and one fifth boyling Water mixt, make the juſt Warmth of common River Water in hot Weather about the autumnal Equinox. *Fifthly*, That a Quart of boiling Water put to three Pints of ſuch cold Water, in an earthen Diſh, at two ſundry times, about ſeven Minutes diſtance, gives the true Warmth of *Buxton*. Or five eighths of a Quart of boiling Water, put to three Pints of common River Water in Summer, gives the exact Heat of *Buxton* Bath in that Seaſon, and then whatever raiſes ſuch a Thermometer five eighths of an Inch higher, ſhews you the Warmth of *Buxton* in a ſtrong Winter Froſt.

19. By theſe Experiments we have the Quantity of Water each Spring ſends forth in a given Time. *Secondly*, The Proportion that the Vehicle and fixt Parts have to one another. *Thirdly*, The Proportions of the Earth and Salts ſeparately. And, *Laſtly*, Which of the different Salts exceeds the other in Quantity.

20. From the ſmall Quantity of the fixt Parts in thoſe Waters to their Vehicle, eſpecially conſidering the ſmall Quantity that ſhould be daily drank, it is plain theſe Parts can do little to the removal of any obſtinate chronic Diſeaſe. Suppoſe *e. gr.* a Man daily drink four Pints of Water, at moſt he ſwallows not with this Doſe, above five grains of Limeſtone Powder, which we ſhall call an alcali or abſorbent, and two Grains and a half of Marine Salt, and as much Nitre, which let us ſuppoſe ſtimulant, What can theſe do? Nay, let him drink half that Quantity of common Water that comes from the white Limeſtone Hills, and he ſhall have as much alcaline Earth, if not ſome fixt Salt, beſides a vegetable Salt, yet who would call theſe Medicinal

Waters? Hence it is plain, that the Virtues of our Waters conſiſt firſt in the pure, ſmooth, fine common Vehicle, then in its Warmth and Mineral Spirit.

21. Is the Bath, when its Doors and Windows are ſhut, warmer than when opened? Is the Bath that is ſhut up on all Sides, warmer than St. *Annes* Well, which is only ſhut up on three Sides? Is this warmer again than *Bingham* that is wholly expoſed to the open Air above and on all Sides? then it is plain, were theſe Waters kept cloſe covered, and their Heat reverberated, they might ſtill be much warmer, which Mr. *Taylor* who is a generous Well-wiſher of Mankind (and ſpares no Charges to promote the Uſefullneſs of the Waters) deſigns to do upon St. *Annes* Well at his own Expence.

22. From the Experiments with the Mixtures, we ſee firſt from the inteſtine Motion excited by the acid Spirits, that the Water contains an Alcali. *Secondly*, Which being precipitated by a Solution of Sugar of Lead, or the Water thrown into an Alembic and diſtilled, and that which comes over with a ſlow Fire tried, neither of theſe Waters ferment with Acids. *Thirdly*, Not only the Alcaline Nature of this Earth, but its Whiteneſs ſhew it to be Limeſtone Powder, though it warm not the Water after Calcination. *Fourthly*, This Earth being calcined in a Furnace which quickly melts Iron, and then applied to the Loadſtone, it attracted this Duſt or Powder briſkly, therefore I conclude it contains alſo Ironſtone. *Fifthly*, Seeing the Water precipitates the Solution of Silver, and a Part of its Salt cryſtalizes into Cryſtals of a Cubic Figure like a Die, then a Part of its Salt is marine Salt. *Sixthly*, Since it lets fall a Sediment with Oil of Tartar, and Spirit of Hartſhorn, *&c.* and alſo affords ſome long Cryſtals with ſix unequal Sides, terminating at each end in a Pyramid under ſeveral Triangles; we ſay it contains alſo Nitre. *Seventhly*, Seeing neither Galls nor other Aſtringents altered this warm Water, we cannot trace any Vitriol volatile nor fixt in it, nor does it taſte Chalybeate, however ſeveral peoples Faith may be before hand with their Taſt, and tho' the Loadſtone does attract ſome of its calcined Earth, the ſame it does with moſt other Earths, which never afforded any Solution of Vitriol, or any Appearance of it. *Eighthly*, Did *Bingham* Well, when putrified, and its Sulphur ſpent become Red with Galls, and Purple with Solution of Silver? then it partakes more eminently both of Nitre, and has more of the Chalybeate Principle in it, than any of the reſt.

23. Did theſe Waters afford ſundry Proportions of Sediment at different times, then they are not continually alike fraught with their fixt Mineral Principles at all Times. *Secondly*, We may hereby obſerve

that when their fixt Contents are leaſt, their volatile Principles are moſt, as in Winter and very cold Weather; and when their volatile Spirit is ſmalleſt or weakeſt, their fixt Parts are encreaſed, as in very dry and hot Weather. *Thirdly*, Have ſeveral Authors examined the ſame Waters at ſundry Times, and found their Contents differ in Quantity, but not in Kind? then are they not to be arraigned and accuſed about ſmall Differences, as is ordinary.

24. Does Dr. *Liſter* tell us, That St. *Ann*'s Water vomits, upon ſwilling down large Quantities? This is nothing peculiar, but what it has in common with all other Water. *Secondly*, Does he aſſert a Quantity of Pit-Coal to lie immediately under the Limeſtone, out of which this Water Springs? It is ſurprizing how ſo good a Naturaliſt could make ſuch a Blunder; for 1st, Limeſtone and Coal are found inconſiſtent with one another, in the *Peak* Country. 2dly, Who ever found warm Water in Coal? *Thirdly*, Tho' the Sediment of thoſe Waters be very ſmall, yet it at leaſt affords a Scruple to a Gallon; tho' he obtained but one Scruple or two out of four Gallons; here muſt have been ſome Neglect or Miſ-management. *Fourthly*, He ſays the Sediment was all Salt, and no Stone-powder, whereas the *Bath* yields above one Half, and ſometimes two Thirds of Stone-powder to one of Salt. *Fifthly*, The Salt, he ſays, is chiefly Marine, tho' this be true of the *Bath*, yet St. *Ann*'s Well contains as much Nitre as Marine Salt, and *Bingham* more than either of them. Nor, *Sixthly*, can I here overlook *Allen*'s Account of this Water. For, *Firſt*, he will have but three warm Springs here, *viz.* two for Bathing, and one for Drinking: Now the outer *Bath* is no Spring, but ſupplied from the inner *Bath*. *Secondly*, He ſays, it is the Warmth of Blood, new let out of the Vein; but had he uſed a Thermometer to both, he would have found the firſt much ſhort of the Heat of the Laſt. *Thirdly*, He will have Lead, Iron and Sulphur to be the Principles that medicate this Water; but how can Lead communicate any of its Parts to the Water, without it be diſſolved? where is the Solvent or Menſtruum? and if it had a Solvent, it would be Vitriol, which would long ago have corroded and conſumed the Lead, and left only a bright Sulphur; and ſince Lead is the chief medicating Principle, the Springs would now be no more than other common Springs. But allowing (contrary to Reaſon and Experience) that the Lead did ſtill impregnate this Water, it would be Poyſon inſtead of Phyſick, as we ſee from the Accidents that happen to Smellers, and Animals that drink the Waters wherein is Lead, how ſoon they are ſeized with a Bellan, and from the Effects of Sugar of Lead taken inwardly. Nor, thirdly, has the Water a ſulphureous

Taſte or Smell as he alledges. Nor, *Fourthly*, do Galls give this the ſame Colour as they do the *Bath* Waters, nor a leaden Colour, which he will have from Lead. The Sulphur he will have to be that of Lead. *Jones* is much righter where he thinks the Water is too pure, delicious and fine for any ſuch Principles as Lead, Copper or Alum, and contents himſelf with an impalpable Sulphur. *

Now let us ſee what medicinal Uſes theſe Experiments and Obſervations will help us to make of theſe Waters; which are improvable by Mr. *Martin*'s Account of the Effects of warm Bathing, [a] whereby

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* Dr. *Allen*, in his *Natural Hiſtory of Mineral Waters*, printed 1711, Page 39, ſays, there are three Wells here of ancient Uſe and like Nature, two for Bathing, and one for Drinking; they are of the warmth of Blood freſh drawn, the chief Mineral here is Lead. Mr. *Biſhop*, the Schoolmaſter there, informed him, that there was Brimſtone and Antimony in all Minerals thereabout; but *Allen* thinks by Antimony is meant Lead, Spelter or Tinglaſs. The Water has a ſulphureous Taſte, and gives a brown Colour with Gall, like the *Bath*, but darker as Lead gives; and there is a Chalybeate not far off; ſo Lead, Iron and Sulphur are the Principles which medicate this Water; the Sulphur is not ſo much in Quantity, nor ſo diſtinct, but a ſulphur of Lead, or in the State of leaden Marcaſites. This Water changes not the Colour of bright Silver, for it wants the ſulphureous Acid, at leaſt in Quantity. The Mines lie in Stone, and there is no Mud thrown up with the Water, to examine. But the Aporrhea may be as much, and as ſtrong, if depth, firmneſs of the Rock, and the Quantity of the Mine, which are Signs, may be a Proof.

[a] *Philoſoph. Tranſactions* N° 407. Pag. 26, and 27. The Spring which is now uſed for Bathing, appears to be 32½ Degrees of one of Mr. *Hawksbee*'s Thermometers, warmer than the common Spring Water there, for the common Spring Water kept the Spirit of Wine at 41, the *Bath* Water raiſed it to 8½. Statical Experiments on the Effect of cold Bathing, having been ſeldom made, the few following cannot be unacceptable.

July 21, 1728. H 10½ at Night.		Weight. ℔ ℥	After Bathing 12 Min	Urine.	*July* 22. H. 8½ Morning		Weight. ℔ ℥	Urine ℥	Weight. 1h. after	20 M. after Bathing.		
	A	137 12	137 11½	3 ℥		A	136 9	9½	135 15	136		
	B	134 15½	134 13½			B	134 1	7	133 7	133 11		
	C	169 15	170			C	168 13	13	167 11	167 14		
	D	119 6½	119 7	4		D	118	15	117	117		
H. 11 after eating, Cloaths changed.		Weight ℔ ℥	After 1½ h. Exercise in *Pools-hole* chiefly under Ground	Perſpir.	After Dinner, Cloaths changed.		Weight. ℔ ℥	℥	Perſpir. in 1½ h. all uſed moderate Exerciſe in walking, only D ſat ſtill reading all the while.	Servant who attended the Bath.	His Weight. 173 ℔ 4℥	After 1 h. Bathing weighed 173 ℔ 6℥ After he had perſpired 1 h. he weighed 172 15℥
	A	137 5		10½ ℥		A	136 14	3				
	B	140 7		13 ℥		B	142 6½	7½				
	C	170 4½		1 ℔		C	170 15	3				
	D	117 8		8½ ℥		D	129 1	6½				

From

by it is plain, *Firſt*, That by the Waters penetrating the Pores of the Skin, it gets into, and mixes with the Blood, and other Juices, on the Bodies Surface, and thereby encreaſes its Weight. *Secondly*, That by this Inſinuation of the tepid Steam into the Pores, the Skin is relaxed, its Pores dilated, the Fluids in the Capillary Veſſels are thinned, their Motion made eaſier, and their Evacuation promoted. *Thirdly*, Tho' the Addition to the Bodies Weight by bathing may ſeem ſmall, yet we muſt allow a conſiderable Diſcharge by Perſpiration during Bathing, both from the Preſſure of the Water, added to that of the Air, upon the Body, and the warming, relaxing Nature of the Water. But to proceed.

Since theſe Waters contain ſo much Air in their Interſtices, they muſt be a very great Promoter of Digeſtion, except they be drank too long, and then from their very Warmth and Nature, they muſt relax the Stomach, and give a reſty Fit to all the Digeſtions, except intermitted. But the Waters being warmed by Bodies of a different Nature, either brought together, diſſolved, or ſet in Action by the Water, this Action cannot be without the Communication of ſome of their Parts, which little Parts muſt be lodged, together with the Air, in the Interſtices of the Water, then not only does the Air (conſidered as a ſimple Æther) promote Digeſtion and Attenuation; but being ſpringy, and full of thoſe ſubtle, inviſible, intractable Particles of Mineral Bodies, or Subſtances, of what a thinning opening Nature muſt they be in Animal Bodies? How near in ſmallneſs and ſubtilty do they approach to the Particles of Light and Heat, ſince we have no Veſſels that retain one more than the other? And ſince they are not retainable in the cold Water, wherein we ſuppoſe the Air in a ſtagnant, compreſſed State, how trifling is it, to imagine or attempt procuring of them by force of Fire in Diſtillation, *&c.* whereby the Air is heated, rarified and expanded, and even their Vehicle, the Water ſo rarified, that it riſes up in a Smoak, in both which they are at greater Liberty than before, to make their eſcape.

From theſe Experiments he concludes, *Firſt*, That warm Bathing encreaſes the Weight of the Body at preſent, tho' it cauſes a plentiful Perſpiration afterwards. *Secondly*, That the Perſpiration after this Excerciſe is nothing near ſo large as Dr. *Keil* has delivered (*Med. Stat.* pag. 16.) it amounting by his Account to a Pound and a Half in one Hours time. But by theſe Obſervations it is but five Ounces in one Hour, and from eight Ounces and a Half to one Pound, in an Hour and a Half, tho' aſſiſted by Motion, which might have cauſed us to perſpire (by Dr. *Keil*'s Computation, *Med. Stat.* pag. 15.) from three to ſix Ounces.

Since theſe Particles are ſo much leſs and more ſubtle than the moſt volatile Spirits, obtainable by Art, as thoſe of Hartſhorn, Sal Armoniac, *&c.* which may be ſhut up and preſerved in ſo porous a Body as Glaſs, how impoſſible is it that the ſmalleſt Veſſels in human Bodies, tho' never ſo obſtructed, (if not grown up and become tendinous) ſhould hinder their progreſſive Motion? Nay, will they not even find a Paſſage between the Interſtices of the Fibres that conſtitute the Sides of the Veſſels, much more in their Cavities? How well then muſt ſuch a Water at the Spring-Head, thus fraught with its ſubtle Mineral Principle, be diſpoſed to ſend on the Errand of opening and clearing the minuteſt Veſſels in the utmoſt extreams of Animal Bodies? Or in the ſmalleſt Veſſels of the *Perioſteum*, in either of the Coats of the Brain, or Spinal Marrow, or in the Brain or Marrow it ſelf? which are the ſmalleſt Veſſels comprehenſible by human Conception. From this it follows, that theſe Waters are better adapted to Obſtructions, from the twentieth Rate Veſſels, to the ſmalleſt in the whole Body, than to thoſe of the Larger and firſt Rate: No Wonder then it produce ſurprizing Effects in gouty, rheumatic, arthritic and ſcorbutic Pains, all which have their Seat in the ſmall Veſſels, yea ſo ſmall as ſcarce to be come at by Medicines. Again, conſider we this Spirit as wrapt up in Air, it is not only ſubtle and penetrating, but elaſtic or ſpringy, ſo that when the heat of the Body is added to its warmth, it will be ſo much more ſpringy, and expand the ſmalleſt Veſſels, relaxing them, and ſo making room for the obſtructing Matter either to be expelled the Body, or ſo thinned as to be thrown back into the larger Veſſels, till it is more attenuated, digeſted, and fitted for Evacuation by ſome of the common Outlets. But is the Water thinning, and the Spirit elaſtic? then not only does the firſt diſſolve the groſs Humours, but the Particles of the ſecond being got between them, and dilating themſelves like a ſpringy Wedge, will turn the attractive force of theſe Humours into a Repulſive, whereby they are gradually ſeparated, broken, and mixt with the intercurrent Fluid; but as the Humours cannot be thinned and divided into ſmaller Particles without encreaſing their Bulk, eſpecially when at the ſame time there is a Quantity of this Water thrown into the Body, and mixed with them. This Fuſion of the Blood diſpoſes ſome of its Parts to get into improper Veſſels, for one Globule being hereby divided into two or three, they are then capable of entering Veſſels that before would not admit nor receive them when only one; and theſe Veſſels being conical, the globular Parts thus divided muſt ſtop, before they can reach the extremity of the Veſſel;

hence new Obſtructions of another kind, from this powerful Diluter, which muſt remain, except either the Veſſel relax and give Way, or the ſtopt Globule muſt be ſplit into two or three others; but by this neceſſary Force, the Action of the Veſſel is encreaſed, whereby the Blood's Motion becomes brisker: And now both the Blood, Quantity and Velocity are encreaſed, but the Coats of the Veſſels not being hereby ſtrengthened, but weakened, according to their greater Dilatation or Stretch, if they were weak before and full of Blood, then Hemorrhages muſt neceſſarily follow, except prevented by due and timely Evacuation, or Reduction of the Humours to their former Standard, that the Veſſels may again be reſtored to their natural Dimenſions, Strength and Reſiſtance. But are we aſſured from Fact and Experience, that there is a mineral Spirit in theſe Waters, and want we to know the Nature of this mineral Spirit? let us get acquainted with the Minerals waſht by the Water, and conſider which of them are capable of a Separability of ſome of their Parts to the Water, and which they are that cannot be acted upon either by Separability or Diſſolubility, and we are ſure that this Spirit muſt be from the firſt and not the laſt, but what theſe Materials are we have ſeen before, therefore the Spirit muſt be of that Nature as its Effects as well as Theory prove. From the whole we ſee, that the Intention and Effects of thoſe Waters are Relaxation and Dilution, and wherever theſe are indicated, this Water will be of the greateſt Service, which is, when the natural and neceſſary Secretions are leſſened, from whence Obſtructions in the ſmall Veſſels; but it is of the greateſt Benefit in thoſe Obſtructions which ariſe from a ſharpneſs, ſaltneſs, or earthineſs of the Blood and Lymph, or from an accidental (where there is no natural Diſpoſition to a) Rarefaction of the Blood, ſome of whoſe Parts have miſtaken their common Road, in all which Caſes we ſuppoſe a *Stimulus* in the Veſſels from Pain; ſeeing it is impoſſible the fixt Parts of this Water ſhould give much *Stimulus*. Its Excellency reaches particularly to all Contractions, Stiffneſs, or Criſpation of the Solids and Veſſels, when their Parts are ſo cloſe that the Fibres are inflexible by ſuch Cauſes as, in a natural and healthy State, ſhould bend them: Or there is a Difficulty, and Indiſpoſition ſometimes in the Fibres and Veſſels, preventing their ready and eaſy Diſtention and Contraction, as is moſtly the Fate of old Age and hard Labourers, which is evident from a more difficult bending and contracting of their Joynts and Muſcles, and from their greater liableneſs to rheumatic and arthritic Pains; and if Youth be hard plied betimes in Life, its Fibres are ſooner ſtiffened, ſtronger, and are at their Growth, or prevented of their full Growth, ſooner; for by whatever means Growth is haſtened and finiſhed, the Period of Life is ſo much ſhortened. Hence ſuch as are of the ſloweſt Growth (living rationally and miſſing Accidents) live longeſt, for the ſame ſpace of Time they take to Growth, they ſtand ſtill as long, and decline the like Time; for ſhould one Man grow till thirty Years of Age, from that he is at a ſtand to Sixty, and grows back again or declines to Ninety, then Dies: Suppoſe we another, who has unnaturally haſtened his Growth at ſixteen, he cannot out-live forty eight, or fifty at moſt: Hence it is plain, that ſuch as rejoyce at their Childrens early Growth, and ſuch as are uneaſy at their ſlow Growth, are equally fooliſh. It is judiciouſly obſerved by *Sanctorius*, that from the time Men begin to decline and grow old, Perſpiration is diminiſhed, the groſs Parts of the Blood are retained, which being gathered to the *Thorax* or Breaſt, are raiſed up by Coughing, or they are heaped up at the Extremities of the Veſſels; the encreaſing Stiffneſs of the Parts ſtill occaſioning a Waſte of the more ſubtle Parts, and a Collection of the groſſer: Hence Diſeaſes from mucous or ſizy Humours, laid up in one Part or other of the Body, as Catarrhs, Rheumatiſms, Pains of the Joynts, Atrophies, Maraſmus, and a gradual diminiſhing of the Actions depending on the ſmall Fibres, as Hearing, Seeing, Memory, Judgment, *&c.* for the Veſſels of the Brain being then partly ſhut up, and partly become callous, ſo as they are unfit for the more noble and elevated Actions, then the Perſon becomes childiſh, and wears out of Life without much Pain or Uneaſineſs, and all from a ſtiffened Fibre and diminiſhed Perſpiration.

Upon the whole, *Buxton* Water being warm, highly impregnated with a mineral Steam, Vapour or Spirit, containing a moſt ſubtle and impalpable Sulphur, and being the product of Limeſtone; it is therefore rarefying, heating, relaxing, thinning, ſweetening, and a little drying, hence it is ſignally beneficial, and ſurprizingly ſucceſsful in the Gout, Rheumatiſm, ſcorbutic and arthritic Pains, wandering or fixt Pains inveterate or recent; Cramps, Convulſions, dry Aſthma's without a Fever or quick Pulſe, bilious Cholick, want of Appetite and Indigeſtion from Intemperance, hard drinking, *&c.* Contractions, Stiffneſs and Lameneſs therefrom in any Part, Barrenneſs from a Conſtriction and indilatibility of the *Fallopian* Tubes and *Uterus*; Painfulneſs, Want, or other Irregularities of the *Menſes* from the ſame Cauſe. In all ſtoppages and beginning of Obſtructions and Stiffneſs of the Veſſels tending to a Concretion and Expulſion of the Fluids; or where external Tumours compreſs the ſmall Veſſels, or where there is an over growth or too great Strength of the Veſſels reſiſting the Fluids. In St. *Anthony's*

Fire, Tetters, Ring-Worms, Scab, Itch, and Morphew, it is alſo uſeful in the beginning of the Swellings on the Bones or *Perioſteum* which are ſoft, yielding to the Touch, or of the conſiſtence of ſoft Wax, called *Gummic*, and *Tophi*, and in Nodes &c. and in chalky Tumours in any Part of the Body inward or outward. In all hard callous Swellings it eaſes Pain and ſoftens much, in old Strains, or Pains afflicting the Perſon upon change of Weather, whether they be originally from broken or disjointed Bones, diſtorting of the Parts, or pulling them out of their natural Poſition: In any withering or pineing of the Parts: In want of Perſpiration from Cold, without a Fever or load of Humours: For Heat, Stoppage and dribbling of Urine: In too great a Contraction of the urinary Paſſages and Strainers; for ſcouring off Sand, Sludge, and Gravel out of the Kidneys: In Hiccup and Vomiting from a ſaline Matter, ſtimulating and contracting the Stomach or Midriff: In a Dyſentery from Salt Humours raiſing violent Gripes and Convulſive Pains. That I enter not into a long detail of the Cauſes of thoſe Diſtempers and their differences, I deſire to be excuſed, being under Engagement to the contrary to my Encouragers, and ſtraitened of Time and Room; the Experiments and Corollaries therefrom do fully explain them to the judicious, and to others it would anſwer no Deſign. I might here ſubjoin ſeveral ſecondary Uſes of this Water, but the common Vehicle being the only Phyſick in them, I ſhall refer my Readers to what I have ſaid on Water in my *Diſcourſe on Tea*, and in the Introduction to this Work. In the above Caſes I ſhould adviſe both drinking and bathing, but by no Means the laſt in a fit of the Gout, inward Inflammations, Fevers, Dyſentery, large inward Tumours, vomiting or purging of Blood, or wherever an outward Preſſure of the Body may do Miſchief.

As to the Age, Sex and Conſtitution of the Patient, in a Word the particular lightneſs and purity of thoſe Waters, entitle their Uſe ſafe and ſucceſsfully without ſcruple to all Ages and Sexes, Children, Youth, Men, Women, with or not with Child, except in the Firſt or laſt Months no Caution or Difference here to be regarded, only I would not adviſe young Perſons very full of Blood and Juices which run with a rapid Courſe in their Veſſels to be too free with them from the twenty third Year of their Life till after the thirtieth. Bilious or cholerick Conſtitutions, phlegmatic and melancholic may uſe them at Diſcretion, with Prudence, but the ſanguine muſt be a little more upon the Watch, for ſince they rarefy the Blood, and encreaſe both its Bulk and Motion, as well as add ſomewhat to its Quantity by Bathing: So their Veſſels being pretty well filled already, as often

ten appears from their low briſk Pulſe and florid Countenance, here the Waters may diſtend the Veſſels more, drive the Blood forward till it cauſe Obſtructions, Stagnation, Inflammations, Fevers or a diſcharge of Blood by ſome Evacuation from a Rupture of the ſtretched and weakened Veſſels. Neither ſhould I be fond of adviſing flegmatic groſs Bodies after the Meridian of Life to continue it long, except for a few Days bathing, to open the Pores of the Skin, thin the ſizy Humours in the ſmall Veſſels there, and diſcharge a Part of them, and ſo fit them for a colder Bath of greater Preſſure and *Stimulus*; not that I am fond of cold bathing in old Age when the Spring of their Fibres is almoſt worn out, but I mean between the Meridian of Life and old Age. As to the Seaſon of the Year for uſing theſe Waters, after ſuch a ſtrict examination and Inveſtigation of their Parts, excuſe me if I differ from the common Opinion, and prefer early in the Spring and late in the Autumn: For conſider we firſt the Luxury of the Age in eating and drinking; ſimple plain Food that was the delicate Diſh of our long lived healthy Anceſtors, will no longer down, our Meat muſt be higher ſeaſoned, we cannot dine but upon ſeveral Diſhes; weak plain Potables will no longer down, we muſt have at leaſt Wine, or which is worſe (as it is more viſcid) ſtrong Ale, or perhaps Brandy and Water; do not all theſe heat and inflame the Body? Secondly, does not the Water of itſelf rarefy the Blood, and relax its Veſſels? and Thirdly are not the Juices of the Body more rarefied? take they not up more Bulk, and are not the Veſſels more relaxed in Summer than Winter? is this then a fit Seaſon to ſend Youth, plethoric and ſanguine People to thoſe Waters? either they muſt uſe them for ſome time, or not, if the laſt, why came they to them? what deſign will a mere complimenting Viſit of the Waters, and perhaps taſting of them, or going into them, anſwer? ſure no valuable End. If they uſe them for any conſiderable Time, are they not expoſed to the mercy of Inflammations, Faintneſs, Palpitations, Fevers eſpecially hectic, *&c?* And will not the Waters anſwer the ſame Intention, with much greater ſafety, from the latter end of *March* to the middle of *May*, and from the firſt of *September* to the firſt of *November?* It is true, the coldneſs of the Place may be objected; but is there not a good Houſe, dry, warm Rooms, and plenty of Coal, and rarely without ſome Company; and a pleaſant, dry Country; where then is the harm, even in the middle of Winter, upon urgent and neceſſary Occaſions? are not the Waters conſiderably warmer? does not their Efficacy chiefly depend upon its warmth and what cauſes it; and the warmer they are, are they not the more virtuous and ſucceſsful? nor is the Blood ſo apt to be rarefied, ſeeing the Air in the

Blood muſt be in *æquilibrio* with the external Air. This is not Speculation, I mention it from Experience, having ordered Patients there in *March* in great Froſt and Snow, and never obſerved better Succeſs than the Water had upon them all.

As to the Method of uſeing the Waters, except the Body be coſtive, and the firſt Paſſages furred up with groſs Humours, I declare my ſelf a profeſt Enemy to what is called preparing the Body for them, by ſtrong purging, which often cauſe Pain in the Bowels, Windineſs, Looſeneſs and Dejection of the Appetite, the chief thing to be regarded and kept up in a Courſe of Mineral (eſpecially Warm) Waters; therefore I content my ſelf with ſimple plain Laxatives, which unload the Inteſtines without Sickneſs, Pain, Confinement or Proſtration of Strength or Appetite, as Lenitive Electuary, Rhubarb, Manna, Cream of Tartar, *&c.* Or if the Stomach is loaded with Phlegm, palled and relaxed, to prevent this being ſent down and carried off into the Body with the Water, and there doing a great deal more Miſchief; I would give a gentle Vomit as of the Infuſion of *Ipecacuana*, or that in Subſtance to ſtrong Bodies, and neither drink nor bath for thirty Hours after at leaſt. Young People full of Blood, or who have a meagre Body and quick Pulſe, I would order to be blooded before they begin. Such as are liable to the Gout ſhould neither be blooded nor vomited, except there were ſtrong Indications to the contrary, but let them have *Tinctura Sacra*, or *Elixir Salutis* for a Purge. When they begin to drink the Waters, a Pint before Breakfaſt, and as much after is ſufficient for the firſt two or three Days, then half a Pint more for two Days more, and at moſt three Pints in a Forenoon; for this Water not being an evacuant, but alterative, muſt not be thrown into the Body in large Quantities, whereby a great deal more hurt may be done than the good we expect: At beſt we thereby turn it to an evacuant by Urine, or receive certain Miſchief. As to Diet, if it be ſeaſonable, healthy, and temperate before, I would have no great Change to be made in it, from what was the Perſons ordinary Way of Life before, only as the Water heats and rarefies, beware of Pepper, Muſtard, Onions, Shallots, Horſe radiſh, and all aromatic heating ſeaſoning; and of all inflaming Liquors, Claret or White Wine and Water for drink are beſt; and when the Deſign is to relax, I would allow Fiſh, but no ſalt Meats, eſpecially thoſe dried in the Smoak, nor Salt Fiſh, Gooſe nor Duck. Breakfaſt between eight and nine a Clock in the Morning, dine at one, ſup at ſeven, let the Supper be light and eaſy of Digeſtion, go to bed at ten, riſe at five or ſix in the Morning, go into the Bath, continue there from ſeven Minutes to half an Hour, according to Strength and the Caſe of the Patient; when you come out, if you go not to Bed to ſweat (which is ſeldom uſed) dry the Body well and dreſs preſently, and if the Weather is cold go to a warm Room, uſe gentle Exerciſe, walking about, and drink your Water. Fly ungovernable Paſſions, Moroſeneſs, ſitting up late, reveling and unſeaſonable Hours, ſhun violent Exerciſe and Intemperance, be cheerfull; if the Body is coſtive, drink Tamarind Broth, or take a Gliſter. If the Stomach is weak, raw, and belching, take a little bitter aromatic Wine before you begin your Water drinking, and when you have drank ten or twelve Days, intermit for four or five Days. But as it would require ſome Folio Volumes to give particular Directions to all People of every Caſe, Conſtitution and Age, for the right and profitable Uſe of ſuch a Number of different Waters, I hope theſe few general Rules will ſuffice, eſpecially as all theſe Waters of greater Note are ſeldom without neighbouring Phyſicians who are capable to give better Rules upon the ſpot, than it is poſſible for me to give here. As a great deal of the Efficacy of thoſe Waters depend upon good Rules well obſerved, ſo it ought to be every ones Care, who has any valuable End to anſwer by them, to have the beſt Advice. Let me add once for all, that as this Water is of ſuch a Nature as I have mentioned, ſo it is not to be trifled with, for if it be unneceſſarily uſed, it will certainly do Harm.

But it may with Juſtice be objected, if theſe Waters are bad for nothing, they are good for nothing; we ſhall therefore give not only its Advantages, but Diſadvantages. Its Uſe therefore is unſafe and unadviſeable, where there is too great an impulſe of the Fluids into the lateral Veſſels, as it relaxes the laſt, and makes more Way for the firſt and rarefies them: Nor is it to be meddled with in Tumours from an impulſe of the Fluids, with a Dilatability of the Solids beyond all Recovery of their natural Tone, and in Swellings from an Extravaſation of the Fluids, no more to be received into their proper Veſſels, as in Ruptures of large Arteries and Veins, whereof only one Coat remains, or in Extravaſation of Blood, *Serum* or *Lympha* into any of the Cavities of the Body, or Interſtices of the Muſcles or Membranes, nor is it ſafe in a natural fullneſs of Juices, and a Diſpoſition of the Body to breed Blood quick. Nor is it adviſeable in any inward Inflammations as of Stomach, Liver, Lungs, Kidneys, or Pleura, or to drink it in large outward inflammations of the Glands, ſeeing it both increaſes the Blood's Motion and Quantity, and diſpoſes it to run more impetuouſly upon thoſe Parts whoſe Spring and Reſiſtance is impaired or loſt, nor is it to be indulged in inward Impoſthumes. It is a Chip in Pottage in theſe Tumours called *Melicerus*, *Steatoma*, *Atheroma*, *Talpa*, *&c.* It is alſo miſchievous in Conſumptions attended with a rapid Motion of the Blood, and weak pulmonary Veſſels; and in too copious Perſpiration: Or in a Word, wherever ſtrengthening and braceing up of the Solids, and thickening and cooling the Fluids is indicated, theſe Waters muſt be refrained, or where the animal Secretions are to be leſſened.

Hence obſerve the following Miſtakes in the Uſe of theſe Waters, *Firſt*, Does their chief Efficacy conſiſt in their volatile Parts, which only conſiſt of a Steam or Vapour, and are they better adapted to Diſeaſes of the ſmaller than of the larger Veſſels? then it is an Error to imagine that all the Buſineſs is done by drinking large Quantities of them, and ſo turning them to Evacuants, at leaſt powerful Diureticks; whereby they are hurried out of the Body before they have done their Work, which lies in much ſmaller Veſſels and requires longer Retention. *Secondly*, Is Evacuation inconſiſtent with all the Intentions of the Waters? then how imprudent are thoſe who uſe evacuant Medicines along with the Waters, whether purgatives or diureticks, which expeditiouſly carry off the Waters, and together with them the thinner Parts of the Blood out of the larger Veſſels, and the *Lymyha* which is poured into the *Chylopeia* for thinning the Chyle: But allow they ſhould drink ſo much more Water in proportion to the encreaſe of the Drains, is this mending the Matter and not making it worſe, for hereby there is a greater preſſure and quantity of Water laid upon the Inteſtines or *Uropeia*, the Fluids in theſe Glands thinned and their excretory Ducts widened and laid more open, and all every way fitted for a larger and freer Vent of the more ſerous Parts of the Blood, which ſhould thin the groſſer in the ſmalleſt Veſſels: Hence Obſtructions are more riveted there, or at beſt not mended. *Thirdly*, Does the Water heat and rarefy the Blood? is it then rational to ſend young People eſpecially thither in the Heat of Summer, whoſe Blood is capable of Rarefaction, when the Warmth of the Water, the preſence of its mineral Principle, joined to the Heat of the Blood, when the hot Seaſon has relaxed the Solids and widened the Veſſels, and the Blood in its greateſt Natural Rarefaction? One would think this Caution needleſs, to ſuch eſpecially as conſider the fatal Conſequences of a very rarefied State of the Air by Lightening to animal Bodies; for the Atmoſphere being ſuddenly rarefied by the Flaſh, the ſudden Expanſion of the Air in the Blood, to a Balance with this Atmoſphere, quickly burſts the Veſſels, mangles Solids and Fluids together as in a Mortification. And the hardeſt Parts which give the greateſt Reſiſtance to this violent Expanſion, are burſt into a thouſand Pieces, the Spring of the Air being ſo much ſuperior to the Coheſion of the Parts. *Fourthly*, Does the Water rarefy the Blood? then how inconſiſtent is violent Exerciſe with their Uſe, as dancing and reveling to unſeaſonable hours, ſtrong Bowling in the heat of the Day, galloping on Horſeback inſtead of an eaſy Trot or ambling Pace, *&c.* Theſe violent Exerciſes heat the Blood too much, and are often of bad Conſequences. *Fifthly*, Is the Deſign of this Water Relaxation and Dilution? then how do ſuch promote thoſe Ends, who deal all the while in Drams, Spirits and Punch, all which contract and ſhrivel up the Solids, as the firſt two very remarkably coagulate the Fluids. *Sixthly*, Do the Waters rarefy the Blood, and encreaſe its Bulk and Motion, and is it ſafe and adviſable for thoſe who have a natural fulneſs or overflow of this Juice, whether as to the Veſſels or Humours, or to ſuch as have naturally a quick Pulſe, large Secretions, thin Bodies, and weak Veſſels? I am ſorry I am put upon uſeing Tautologies in this Manner, but neither the good nor bad Effects of this Water having been before ſhown from true and ſolid Principles or demonſtrative Arguments, as its Uſefulneſs and Nature requires, I cannot be too much upon my Guard nor give too much Caution, eſpecially in an Age when plain Truth in an eaſy Dreſs prevails ſo little againſt Taſte, Cuſtom, and depraved Inclination; for, once more give me leave to ſay, theſe Waters are not to be trifled with, for if their Uſe is not wanted, and does no good, they certainly do Miſchief, and whoever ſays the contrary, votes theſe Waters good for little or nothing, and if they underſtand the Waters right, may as well adviſe the *Peruvian* Bark in continual Fevers, or during the Fit of Intermittents, or Steel Medicines in a *Plethora*, or Sugar of Lead in a Dropſy or Palſy, or Camphire in the Declination of a hot Fever, which has parched up and dried the Body, and almoſt worn out the Spring of the Veſſels. But *Seventhly*, Are theſe Waters warm and impregnated with a very volatile penetrating Part, wherein lies their chiefeſt Efficacy, and is this Principle gone when they are cold? then they muſt be drank warm at the Spring to anſwer any End; for when they are cold they only ſerve inſtead of common Water, being purer and better than that. *Eighthly*, Is the Nature of theſe Waters relaxing and thinning? then ſpecial care muſt be taken, that a ſuitable diet both in meat and drink be ſtrictly obſerved, and that the Patient refrain every thing that's oppoſite to their Uſe, and gave Birth to his Diſtemper, tho' never ſo much his favourite, and ſeemingly oppoſite to Nature. *Ninthly*, Is the chief deſign of theſe Waters Relaxation and Dilution? then are they improper in Obſtructions from a Sizineſs of the Juices and a Relaxation of the Veſſels, as in Cachexies, Dropſies, *&c.* *Tenthly*, But ſay ſome prejudiced Perſons, if you can find out the Nature of this mineral Spirit, in which you aſſert the Efficacy of theſe Waters to conſiſt, why may they not be imitated, and ſo People ſaved much Labour and Loſs of Time and Expences, as well as bring Profit to your ſelf? Anſwer, 1st imitate it with what? Whether with fixt or volatile Bodies? Where will you furniſh me with Matter divided into and exiſting in ſuch ſmall ſubtle, incoercible Particles? Or where is the Art that can reduce mineral Subſtances to ſuch a volatile fugitive mineral Spirit, a Spirit that cannot be retained? a Subſtance of almoſt as minute Parts, as thoſe of Light and Heat, a Steam fitted to paſs the ſmalleſt Crannies in Nature. But 2ly, ſo exquiſite is the Mixture and ſo great the difference between divine and humane Compoſitions, that the firſt is inimitable. What Anatomiſt that knows the Structure of a human Body the beſt, will undertake to make another like it? Or what Chymiſt that can ſeparate the Principles of a Plant to the greateſt Exactneſs, will yet have Aſſurance to boaſt of his Capacity ſo far as to reunite even the ſame Parts again in the ſame Form and Condition, with a vegetable Life? even ſo different are the Compoſitions of God and Man. Hence we ſee that he which made theſe Bodies and Veſſels at firſt, is beſt judge of their Diameter, and knows beſt how to prepare Subſtances ſuited to their Dimenſions and Diſeaſes; therefore could we pretend to mimick theſe Waters, yet the counterfeit would be as much inferior to the Natural, as a Piece of Painting tho' never ſo fine, is to the original Life.

Of MATLOCK, *and the other Waters in* Derbyſhire.

FROM *Buxton*, go we thirteen or fourteen Miles upon a moſt eaſy open Road, Southward to *Matlock* Bath, which is a Mile from *Cromford* Bridge, as far from *Matlock* Bridge, ten Miles from *Derby*, ſeventeen from *Nottingham*, ſixteen from *Sheffield*, eight from *Cheſterfield*, ſeven from *Bakewell*, and three from *Wirckſworth* : It is a few Minutes beyond the 53^d Degree of North Latitude, ſituate upon the Eaſt Side of a high Hill, at the Foot whereof flows the River *Derwent*, whoſe Waters are very clear and ſweet; its purling Noiſe is echo'd back by prodigious Rocks and Mountains on all Sides; it is well ſtockt with Trout, Grillin, *&c.* From a little beyond the Bath-houſe Stables, this River runs almoſt North and South, till it reach *Cromford*; and a ſhort Mile on the Eaſt Side facing the Bath, runs a beautiful range of Limeſtone Rocks, with a pleaſant Mixture of white Chertſtone. In that Place directly oppoſite to the Bath, its Perpendicular above the *Derwent* is eighty Yards; little more than a Quarter of a Mile North on the ſame Eaſt Side, is *Matlock* high Torr, whoſe Altitude is a hundred and forty Yards. Beyond this range of Rocks are pleaſant Meadows and Paſtures, fruitful Corn Fields, and a charming Grove of Wood, above which riſes *Rybur* Hill, which defends theſe Fields from both eaſtern and northern Blaſts. Theſe wonderful Precipices oppoſite to the Bath are charmingly beautifyed with rows of Oak, Elder, Aſh, Maples, Yew, Ivy, *&c.* one above another, as though they had been regularly planted. The Height of the Bath above the *Derwent* is ſixty one Feet, and from it to the top of the Rocks behind, and on the Weſt Side of the Houſe, is one hundred and twenty Yards perpendicular, where ſtand ſeveral ſmall Cottages, on a Level with *Matlock* high Torr, *viz.* one hundred and forty Yards. From theſe Cottages run ſeveral ſmall Graſs Closes on another Aſcent, which anon becomes very ſteep and rugged, and riſes almoſt to a Level with the top of *Maſſon*, whoſe Summit is two hundred and fifty Yards above the *Derwent*. On the North and North-weſt Side of the Bath riſe

Weſtup's towring Hills twenty Yards above the high Torr, on the lower and ſouth part of which is a ſmall Grove, with dry Meadows, fruitful Paſtures, Houſes, Mines, *&c.* above theſe is a rugged ſteep Aſcent, on the top of which *Proud Maſſon* raiſes his lofty Head. On the Weſt Side of the Bath, is another ſteep and almoſt inacceſſible Aſcent of prodigious Crags and Rocks, lying on heaps like the Ruins of ſome frightful Mountain tumbled down, above which are ſome Houſes and Incloſures, and then another Hill heaped like *Pelion* upon *Oſſa*, at the top of which is a dry delicious Plain commanding a very large Proſpect, except on the North Side, where it is bounded by *Maſſon.* From this delightful Plain which commands ſome parts of *Staffordſhire* and *Cheſhire*, the ſight is entertained with ſeveral Towns, Villages, Churches, and Gentlemens Seats, ſome ſinking into and others riſing out of Ruin, with a great Variety of hideous Rocks, craggy Mountains, pleaſant Groves, and fertile Vales, beautifully intermingled, which at once ſurprize and pleaſe the wandring Eye. Here you breath a pure, thin, and fragrant Air, which in the ſummer Seaſon is impregnated with the grateful Odour of a thouſand Herbs, Plants, and Flowers, which cloath and beautify the Hills and Mountains; and while the feather'd Tribe from the neighbouring Trees and Grotto's are freely contributing their melodious Notes to your Entertainment, you may hear your eviſcerated Mother Earth groaning under the rude treatment of her Sons, who, with various cruel Inſtruments, are tearing out her very Bowels.

On the South and Weſt Side of the Bath, is a continuation of the ſame ridge of Mountains, beautified here and there with Trees [i].

All the warm Waters ſpring up from between fifteen and thirty Yards above the Level of the River; for either higher or lower the Springs are cold, and only common Water, ſo that the materials warming and impregnating theſe Waters lie in that Height. From the moſt Northerly to the moſt Southerly of theſe warm Springs is about five hundred and ſeventy Yards. They lie in the following Order, from the warm Spring behind the Stable to the Bath, is about one hundred and eight Yards, from the Bath to the firſt of the warm Well Springs, about four hundred Yards South; from that to the Second ſix Yards, from this to the Third, ſixty four Yards South Eaſt; from the Second to another warm Spring, South Weſt, or rather Weſt, in the next Cloſe but

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[i] The Charms and ſurprizing Beauties of this Place have been attempted by ſeveral Hands, I ſhall here preſent my Reader with the two following Eſſays of this kind.

Hail,

but one to the Road, about twenty Yards; and twenty Yards North, at the back of the Kitchen, is another warm Spring which ſupplies the Houſe with Water. All theſe Fountains, except the laſt, throw forth ſuch Quantities of Water, that their exact Commenſuration, required a great deal more Time and Expence than my Buſineſs would permit, or the Proprietor of the Place deſerved, not having given the leaſt imaginable Aſſiſtance to this Deſign. Beſides the beforementioned, there are ſmall Rills or Springs within the aforeſaid Space. And on the South ſide of the Hill, about half a Mile South Weſt, there is a prodigious quantity of warm Water thrown out of the old Lead Works, which go under the Name Balls-Eye[k]. Theſe Rocks and Mountains are beautifully

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HAIL, awful *Matlock*, Nature's chiefeſt Pride,
What to all other Places is deny'd,
Thou, thou alone enjoyeſt. Thou keep'ſt the Form
Which Nature gave thee, nor can Art transform,
Or change thy Beauties which to thee ſhe gave:
When by divine Command, firſt from the Grave
Of Nothing roſe this Earth. In vain ſhall Art,
Attempt ſuch pleaſing Beauties to impart
To our aſtoniſh'd Eyes: In vain the Skill
Of Painters, or the Poets forming Quill.
Thy Hills in Horror beautiful ariſe,
And ſeem to touch the Summit of the Skies;
Thy clear and purling Waves through Valleys flow,
The winding Mazes intricate below.
Thy Greens in various Shades delight the Eye,
In tender Shrubs, or Trees aſpiring high.
Silent I ſtood, and ſilent I admired,
From Company, nay from my ſelf retired, *&c.*

ON whoſe ſweet Southern Banks fair *Matlock* ſtands,
At once the Valley and the Cliff commands.
Cloſe to its Verge, the ſleepy Alder grows,
Nods o'er the Current, that loquacious flows.
The Pale leaf'd Aſh, as if ſhe'd got the Spleen,
Adds Beauty to the Oak's deep tinctur'd Green.
The gilded Mapple courts the am'rous Sun,
Reflects his Glory to the ſharp horn'd Moon.
The hardy Holly taunts the ſturdy Yew,
That from the jetting Rocks project to View;
Profuſely there in fair progreſſion riſe,
And animate the Steep with wild Surpriſe.
The jetting Rocks proud Caſtles ſeem in Air,
That bold Defiance to Invaders dare.
O'er theſe, a-top, the *Linden* waves his Head,
Chaplets the Summit, and o'er-looks the Mead, *&c.*

[k] But tho' all thoſe curious natural Beauties conſpire to charm the outward Senſes of Strangers, and render the Place the pride of Nature, and put to the Bluſh the moſt refined Art and Artiſt, yet are all theſe (except the warm Waters) the ſmalleſt and moſt inconſiderable part of its Excellency; for the Bowels of its Earth afford far greater Riches than the Surface of the fruitfulleſt Soil can produce; for all theſe Mountains and prodigious Rocks are only ſo many Repoſitories for thoſe Minerals which they contain; the richeſt part whereof yet diſcovered was *Balls-Eye*,

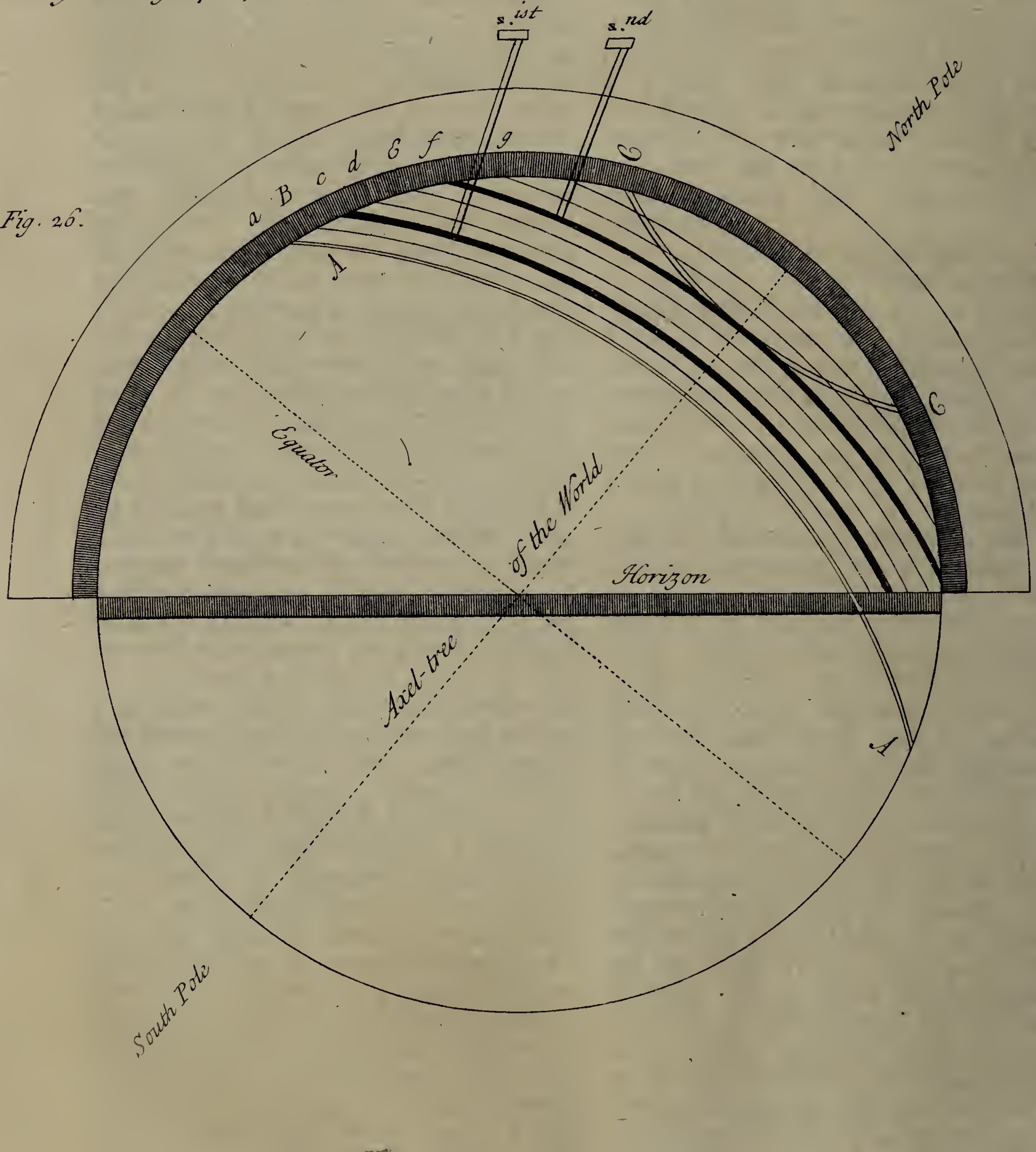
beautfully and richly cloathed with Harts-Tongue, wild Sage, Marjoram, Thyme, Maidenhair, ſeveral ſorts of Geranium, *&c.* All along this Courſe of warm Waters, from their firſt Eruption down to the River, are the greateſt Heaps, and moſt ſurprizingly large Petrefactions of any Place in *Britain*; they are ſo ſoft, before they are expoſed to the

Eye, which was a natural Grotto formerly filled with Ore, even ſo high, that above *Bonſal Brook* it reached within a Yard of the *Day*. This Ore, tho' none of the beautifulleſt (being of a blackiſh duſky Colour) yet was the richeſt in the Neighbourhood, for each Fudder of it on refining afforded about twenty Ounces of good Silver. Nine Diſhes of well-waſhed and cleaned Ore generally goes to a Load, each Diſh weighing about four Stone and a half, and between ſeven and eight Loads afford eight Piggs or a Fudder of Lead, each Pigg weighing twenty two Stone. But there is no certainty of the exact Quantity of Lead obtained from the Ore of different Mines, ſome Ore having more Sulphur, other leſs; it is alſo kept a Secret by the Lead Merchants, what Quantity of Lead the Ore of any Mine contains; for they buy the Ore of the Miners at as cheap a Rate as they can. Where the Mouth of *Balls-Eye* Grotto opens to the *Day*, it is a hundred Yards above the Level of *Bonſal Brook*, all which it loſes in ſloping or dipping down till it come to a Level with the Brook; the Shaft or Pipe ſunk to this Level was Sixty-ſix Yards, the *Strata* of Earth digged through, were, 1. Turf and Corn Mould two Foot thick. 2. A reddiſh brick Clay from half a Yard to two Yards. 3. A looſe or baſtard Limeſtone ſix or ſeven Fathom Deep. 4. A blackiſh and ſome Beds of whitiſh Clay lying from ten to twelve Fathom thick; thus far all Drains or Springs of Water were cold, and very little Shale or Braſil. All along the Lead Vein ran a Current of warm Water, but all above, and on its Sides, were cold Springs. Along the Sides of this Level, and by the Sides of the Vein, at Twenty-ſix, Twenty-ſeven, and Twenty-eight Fathoms deep, laid ſeveral ſtrong Ribs of Braſil. The Maſs of Lead in one Place was ſeven or eight Fathoms high, and twenty Fathoms wide, which in a ſhort time advanced twelve Thouſand Pounds of clear Money; but being drowned out with Water at three Years end, they loſt their Vein, when it had produced above fifty Thouſand Pounds worth of Lead.

This Ore was ſo full of Sulphur, that in Smelting, a blue Flame of a Hand breadth thick ſtood over it, as though a Piece of Brimſtone was thrown into an open Fire, and a moſt ſuffocating Stench, enough to choak any living Animal. The more Silver is in the Ore, the more Sulphur it contains, and the greater Dangers are the Smelters in of the Belland, which is a Diſeaſe attended with violent Convulſions, ſhortneſs of Breath, a pale yellowiſh Complexion, loſs of Appetite, dry Cough and Hoarſneſs; firſt a Feebleneſs, then a Palſy and loſs of the Uſe of the Parts. Horſes break Paſture and run four or five Miles in queſt of this Belland Graſs, which is exceeding ſweet (from the ſmall Lead lying upon it) and ſurprizingly fattening, but kills effectually; for the Horſes can never be quite cured; change of Graſs and Air, with much hard Labour, are the only Palliatives. Several ſuch fat and diſeaſed Horſes are ſent by the Owners out of the *Peak* Country, to be ſold where that Diſeaſe is not known; but theſe are its certain Signs, 1. Short Winded, like a Horſe whoſe Wind is cracked. 2. They heave and lift much at the Flank. 3. They groan very ſore on the leaſt Exerciſe. 4. When far gone and near dying, they fall into Convulſions. The People of this Country ſeldom rear any Puppies as far as the Smoak or Water of theſe Smelting Milns reach. A Gentleman

Plate for Page 75. 76.

Fig. 26.



the open Air, that you may eaſily crumble them to Pieces with your Fingers, and are very light, but afterwards they turn of a ſmoaky blue Colour, become very hard, and are more durable than ſeveral ſorts of Stone, ſo that the Neighbouring People top their Chimneys, make Fences, and build Vaults or Arches with them, at very little Charge. Any

tleman had a Hen died of the Belland, a tame Fox eat her, fell into terrible Convulſions, and died the third Day after. But of all other Creatures, Cats are the ſooneſt infected with this Diſeaſe. Chickens and all ſorts of tame Fowls catch it, but when they begin to be lazy, the Owners open the Stomach, cut the Craw, take out much Lead, waſh the part, put a little Butter in it, ſew it up again, and many of them recover. The more Silver is in Lead Ore, it rings, but that which has little Silver, rings not.

Give me Leave to this to ſubjoin a part of two Letters from Mr. *Anthony Tiſſington*, near *Matlock-Bridge*. He, and He only is the moſt ingenious of all thoſe I have met with about theſe Mines, and gives the beſt Account of the Minerals and Foſſils of that Country. The firſt is of

May 13, 1732.

“WE have three ſorts of Lead Ore common in this Country, *viz.* Dice Ore, Steel Ore, and Firm Ore; the firſt contains as much Lead as any, and is generally lookt on as the fineſt, if a Piece of it is broke, it ſtill falls into leſſer Dices ſimilar to the firſt; from which Figure it has its Name; it is alſo called Potters Ore, becauſe with it they glaze their Pots. Steel Ore, has its Name either from its blackiſh Colour, or from its Hardneſs, for when broken, it reſembles Steel, and is thought to be barren of Silver; however it is rich in Lead, and contains near as much as the firſt. Firm Ore, or ſoft Ore, is almoſt of the Colour of Lead it ſelf, but much ſofter than either of the former, inſomuch that when the Workmen bruiſe it with their Hammers, it ſpreads like a piece of Clay; this ſort often contains great Store of Lead. There is alſo a Lead Ore, that lies like ſmall Marcaſites in Spar, Cauk or grayiſh Stones, in ſmall Grains; this is very bright, but it is ſtill one of thoſe three ſorts; for theſe comprehend all kinds of Lead here.

“Spar we have in Plenty, and that of four ſorts, 1. Glaſs Spar, it is of a whitiſh Colour, very tranſparent, and ſo poliſht, that it will anſwer the Deſign of a Mirror. 2. Yellow Spar, which is not ſo common as the other, often being joined with other Minerals; it is ſometimes tranſparent, but there are ſeveral ſorts of it. 3. White Spar, it is very brittle. There are ſundry kinds of this, as Sugar Spar, &c. 4. Blackiſh Spar, it is very tranſparent, and all its Parts are Rhomboids, and we often find all four in heaps; there are many other Sorts, but theſe are the chief ſimple Spars.

“Our Limeſtone Rocks abound with Subſtances like a *Nucleus* or Kernel, ſome like Cockle or Oyſter Shells, others like Screws, ſome like Strings of Beads, &c. Specimens of thoſe, as alſo of the ſundry Sorts of Ore and Spars I have ſent you. I am Sir, &c.

Anthony Tiſſington.

The Second Letter.

Feb. 23. 1732-3.

“A Draught of the North Hemiſphere (*vid. Fig.* 26.) The great *A* ſhews the double Line, ſignifying the Tropic of Cancer. Great *C* the Artick Circle, betwixt which lyeth our Country Mines. The great *B* and *E* ſhew the two black Lines which repreſent two Veirs, or the ſtriking Paſſages of Lead Ore.

Any ſtrong Acid dropt upon them, raiſes a great Fermentation, hiſſing and bubbling up with a ſulphureous Smell and Smoak, and turns them to a Jelly. The Country People call theſe Petrefactions Marle; ſeveral have informed me, that pieces of them laid in common Water, coaleſce in time, and if ſo, they might anſwer the ſame deſign of rotten-ſtone, which is brought from abroad, and ſold at four Pound *per* Ton.

“ The ſmall Letters, *a*, *c*, *d*, *f* and *g*, ſhow the ſmall Lines repreſenting the Beds of Stone, which I ſuppoſe lie Horizontal to the Pole, as in the Figure.

“ There are various kinds of Stone, *viz.* Whiteſtone or Limeſtone, Blackſtone, Dunſtone, Brownſtone, Cherſtone, *&c.* but the Courſe of their Lines is uncertain, for the ſame Stone keeps not an exact regular Courſe in all places, therefore nothing particular can be ſaid of it, I ſpeak only in the general as to the Scheme, in which caſe it will hold good.

“ Now as to one particular Bed of Stone it is not always alike, for in ſome Places its harder, in others ſofter, in ſome heavier, in others lighter, ſome more porous than other, but the black Stone is the moſt porous. According to our Obſervation, the deeper any kind of Stone lies under the Earths Surface, the greater is its Gravity.

Demonſtration.

“ The ſhaded Semicircle repreſents the Earths Surface, unto which the Veins of Lead Ore are caſt up by the Beds of Stone, and in theſe Places we diſcover our Mines. Then beginning at *B*, we cut what we call a Drift along the black Line, till we are ſtopt for want of Air, then we ſink a Shaft at *Z* firſt, which cuts through the Beds of Stone, and falls into the Vein; up this Shaft we draw our Ore, Earth, or Stone, it alſo ſupplies us with freſh Wind; from thence cutting ſtill forward in the black Line *B*, we are got ſo far on, as to want freſh Air again, then we ſink another Shaft at Z ſecond, in the ſinking of which we diſcover another Vein, which runs directly over the other, till caſt out by the Stone; this we call an upper Level to the former, ſince a perpendicular Line or Shaft let fall from Z ſecond, cuts both.

“ Thus (Sir) I might deſcribe more, but theſe are ſufficient, in that it is moſtly impoſſible to have three Veins at once, for before the third is found, the firſt is got under Water, otherwiſe it is probable they ſucceed one another in the ſame Order.

“ There are ſome few Veins which range Eaſt and Weſt, but not ſo many or conſiderable as to deſtroy the former general Hypotheſis.

“ From hence it is evident, that were there a Paſſage through the Earth in a perpendicular Line, or along its *Axis*, we might diſcover innumerable Veins, cutting us at right Angles, for they generally lie in the ſame Order. But as Greetſtone, Shale, *&c.* breed or lodge not Ores like the other Stones (they keeping their Courſe like the other Stones) therefore it is that ſome Countries where they are caſt up to the Surface bear not Minerals like ours.

“ Sir, I hope you will not look on the preceeding Lines and Schemes as tho' they came from a Perſon who was Maſter of what he only aims at; but conſider them as the Production of an illiterate Pen, tho' truely agreeable to Truth, and intirely founded upon, and agreeable with Obſervation and Experience in this Country.

Sir, your humble Servant,
Anthony Tiſſington.

All the warm Waters which exceed from the Roof or Arches of ſundry ſmall Grottoes hereabout form little Pillars or Priſmes of various different Shapes and Figures, ſuch as Bones of all ſorts, Hartſhorns, Corals, and ſome faint repreſentations of ſeveral parts of Animals; but the warm Waters above ground form another ſort of Petrefactions, *viz.* by incruſtation at firſt; but afterwards it totally conſumes or deſtroys the Body on which it gather'd, and aſſumes and retains its genuine perfect Shape, as Moſſes of ſeveral kinds, Graſs, Leaves, Sticks, *&c.* Theſe, without all peradventure, are the fineſt Petrefactions I ever met with, nor are there any more of them in *Derbyſhire*, except near *Winſter*, and at *Alport* in the Duke of *Rutland*'s Liberty.

As to the Healthfulneſs of this Place, if the moderate quickneſs of a Stream, its plentiful Impregnation, with primogeneal Salts and Sulphur, if freedom from Stagnations, vapid and ſtinking Exhalations of ſtanding Pools, Marches, or boggy Grounds, can promiſe good Water, here we have it in Perfection in the *Derwent*, and in many fine Springs on both Sides of it; and if the clearneſs, ſweetneſs, lightneſs, continual motion and purity of Water, tend to promote Health and prolong Life, here we may reaſonably expect to find theſe valuable Bleſſings. For if plenty and goodneſs of Fiſh be any Indication of good and wholeſome Water, it is here at *Matlock*; if exemption from Fens, Marſhes, Lakes, Ditches, or peſtiferous Steams and Vapours, if the clearneſs and purity of the Air, if a dry Situation, ſcreen'd from the baleful chilling Blaſts of North Eaſt, and Weſt Winds, and fully expoſed to the Sun the whole Year round, the Atmoſphere being perfumed with the fine odoriferous *Effluvia* of fragrant and ſalutary Plants, if all theſe together are capable of rendring any Place delightful and healthy, we may then pronounce *Matlock* to be ſo.

But to return to the warm Medicinal Waters, as we are ſure that ſome of them come from a Shaft called the Cobler, (which is directly above the warm Well Springs, and hath one very plentiful warm in it, which finding a Paſſage through the Chinks and Crannies of the Rock, empties into the warm Springs below, and ſaves the Miners the trouble of a Level) we ſhall therefore be very particular in examining their Earths and Minerals. On a diligent Diſquiſition of them, I found Turf and Corn Mold firſt, then ſome Toad-ſtone, ſo ſhallow in the Earth, that in ſome Places it lies expoſed to the Day, where by the Air it becomes more light, ſoft, and porous, full of little Holes like Birds Eyes, and then it is called Toad-ſtone, but before Black-ſtone, after this white Lime-ſtone, with black and white Cher-ſtone, which is a hard pellucid Subſtance, and truly a baſtard Flint. There is in other

Places a green Cher-ſtone, then Cauk and Lime-ſtone; of the firſt are two Sorts, red and white, it is a ſolid ponderous Mineral, but not ſo very hard before it be expoſed to the Air; the red is the more ponderous; next, is a mixture of white and black Croil-ſtone encompaſſed with, and cloſely adhering to Lime-ſtone; here the Waters begin to be tepid: then I came to great ſtore of black Croil, Spar, Lime-ſtone and Ore, with ſome little Cauk, and by and by to a ſtrong thick Bed of black Croil, ſet about with Spar, and mixt with Ore in the Bowels of the Limeſtone. Here the Water riſes up with an impetuous Force, and at its full Warmth, forty Fathoms deep. This Water raiſed the Spirit in the Thermometer (the Diameter of whoſe Bore was one twenty ſeventh part of an Inch) ſix Inches, and ſix eighths above the common Water, or *Derwent* River. I went twenty five Yards lower down, where was another Spring which raiſed the Spirit only five Inches and a half above the *Derwent*; after this Experiment, I went down to the Water in *Balls-Eye* which is a little lower, where the Spirit in the Thermometer was five Inches and one fourth, ſo that I found I was paſt the greateſt Warmth of the Water, for there the Water is warmeſt, where the black Croil is thickeſt in the black or blue Lime-ſtone. In the Subſtance of theſe Bodies run ſeveral ſmall Veins of Minerals, of a reddiſh, browniſh, whitiſh and duſky Colour, which being heated by the Workmens Iron Wedges driven into them, emitted a ſulphureous Subſtance, which frying out like Greaſe ſmell'd intolerably ſtrong of Sulphur. I brought ſome of each of theſe Minerals home with me, tyed up freſh in Bladders, to examine them at more leiſure. Here I had the Pleaſure to ſee ſome ſubterranean Petrefactions in their threefold State, ſome beginning like the Cream of new Milk, others formed, but ſo ſoft and brittle they ſcarce would bear the touch; a few Drops of Oil mixt with this, makes a ſtrong durable white Paint, which is indefaceable while the Surface of the Wood endures; and others hard and firm and finiſh'd Petrefactions. I found alſo in ſome Places, that had not been lately wrought, or trod upon, ſeveral Excreſcences like a greeniſh white cryſtalized Salt, which diſſolved to Water with the leaſt Heat, though hard and criſp when taken up: of this I gathered a large Quantity, but had loſt it all to four Scruples before I got from the Mine to the Bath-houſe, which I infuſed all Night in Water; what remained weighed eight Grains leſs; then I laid it on a red hot Iron in the Dark, it crackled much, ſmoakt and burnt blue, and weighing it again; it had loſt ten Grains more.

Inorder to diſcover the true Ingredients of theſe Minerals, I poudered five Ounces of the black Lime-ſtone, put it in ſome common Water, and took a common Thermometer which ſtood at twenty above temperate, ſetting it in Pipe Water, the Spirit fell to ten below temperate, then I ſet it in an infuſion of poudered unburnt Limeſtone, but the Spirit continued at the ſame Height, nor was it alter'd by removing it into an Infuſion of poudered Croil-ſtone. Mixing the two Infuſions, I ſet the Thermometer in them; here the Spirits preſently roſe up to five below temperate. I then prepared an Infuſion of powdered Cauk-ſtone, and of black Croil-ſtone in Water; when both had ſtood all Night, I pour'd off what was clear, and filtred them, the Tincture of Nephritic Wood turned both to a deep Green; Tincture of Rhubarb to a deep Yellow, Spirit of Hartſhorn to a whitiſh Colour, Syrup of Cloves to a dark blueiſh Clear with a greeniſh Caſt, Syrup of Violets to a Green. The only difference between them was, that Syrup of Violets turned the Infuſion of Croil-ſtone to a deeper Green than the other, and Tincture of Logwood gave a deeper Colour to the firſt; the latter was much whiter, and let fall more Sediment with a Solution of Sugar of Lead, Oil of Tartar, and Spirit of Hartſhorn. Then I tried a filtred Infuſion of both theſe Stones burnt in the Fire. Solution of Silver turned the Infuſion of the Cauk-ſtone to a whitiſh Clear, and the Infuſion of the Croil-ſtone to a blueiſh Clear; Tincture of Nephritic Wood changed the firſt White, the other to a deep Green; Tincture of Rhubarb turned the firſt a muddy Yellow, the laſt to a beautiful Red; with Oil of Tartar, the firſt was a browniſh White, the laſt clear with a white Sediment; the firſt was blackiſh, with Syrup of Cloves, the laſt Greeniſh; with Syrup of Violets, the firſt was a greeniſh Blue, the laſt a deep Green. With Tincture of Logwood, the firſt was a reddiſh Brown, the other a deep Scarlet red; With Tincture of Galls, the firſt was a muddy Clay Colour, but became greeniſh in two Days, the laſt a deep Green in eighteen Hours. I made the ſame Trial with Cher-ſtone, but found no Signs of any Salts, Iron, or Copper, only Syrup of Cloves turned its Infuſion of a darkiſh Green; and Violets, of a green Colour. Toad-ſtone and Black-ſtone gave no ſuſpicion of Iron, but Oil of Tartar, and Spirit of Hartſhorn, turned both Infuſions White and Cloudy; Syrup of Cloves made both of a deep Oak-leaf Green; Syrup of Violets changed both greeniſh, but it quickly faded: both were inſtantly Green with the Tinctures of Galls and Sumach, and very Red with Tincture of Logwood. Laſtly, I made theſe ſaline Effloreſcences, and beginning Petrefactions, paſs through the like Infuſion, Filtration, and Trial. The firſt with Solution of Silver was clear, the laſt a light purple Colour; the firſt with Tincture of Verdegreaſe was clear with an orange Sediment, the laſt clear with a blue Sediment; the Tincture of Nephritick Wood turned the firſt Green with Sediment, the laſt Green without Sediment; the firſt with Tincture of Rhubarb was of a dark Yellow with Sediment, the laſt a tranſparent deep Yellow, with Solution of Sugar of Lead, the firſt had a light-brown Sediment, and with Solution of Sublimate, the Liquor was clear, and had a variegated Pellicle, with an orange coloured Sediment, the laſt, with Sugar of Lead, was clear, with a white Sediment, and with Sublimate, a dark clear, without Sediment; the Oil of Tartar threw down a brown Sediment in both; the firſt with Syrup of Cloves was blueiſh, the laſt clear; Tincture of Logwood turned the firſt to a dark Brown, the laſt to a deep reddiſh Brown; Tincture of Galls changed the firſt to a light Green full of Clouds, the laſt to a very deep Green, with much Sediment; and both were Green with the Tincture of Sumach. Croil-ſtone is of various Colours, black, blue, white and green; but the blueſt of it put into the Fire, and burnt for half an hour, is white as Paper, very ſoft and ſandy; though it is ſoft in the Earth, yet it hardens in the Air, and turns blue or purple: We only find it near the Warm-water Springs, where the black and green Spar are obſerv'd to eat out the Ore, tho' the white and ſugar Spar are friendly *Strata* for it; for when the Miners meet with this, they think it a ſure Sign that they are near the Ore. Among all theſe Foſſils I could find but very little Braſil, tho' the Black-ſtone is often mixt with red and white Pieces, which afford Phenomena common to them both; upon great Friction or Attrition it is much heated, and becomes ſoft, porous, and brittle, by being expoſed to the Air, and yet it is full of Sulphur. The Dun-ſtone, as far a I could perceive, is a mixture of Clay and Lime-ſtone, not yet hardned, being ſoft when taken up, but turning very hard in the Air. Here I obſerved white, brown, and liver-coloured Cauk, which ſeems a coarſer kind Spar, with a deal of Earth in it.

From the Examination of the Foſſils, we ſhall proceed to that of the Waters, which were firſt taken Notice of about the Year 1698. When the Bath was built and paved by the Reverend Mr. *Fern* of *Matlock*, and Mr. *Heyward* of *Cromford*, and put into the Hands of *George Wragg*, who, to confirm his Claim and Title to it, took a Leaſe of it, of the ſeveral Lords of the Mannor, for ninety nine Years, paying them a Fine of one Hundred and fifty Pound, and the yearly Rent or Acknowledgment of Sixpence a-piece. He then built a few ſmall Rooms adjoyning to the Bath, which were but a poor Convenience for Strangers; but his Leaſe and Property being lately ſold to Mr. *Smith* and Mr. *Pennel* of *Nottingham*, for near a thouſand Pound, they erected two large commodious Buildings, with Stables, Coach-houſe, &c. made a Coach Road along the River Side from *Cromford*, and opened a better Horſe Way from the *Bath* to *Matlock-Bridge*. Mr. *Pennel* having bought Mr. *Smith*'s Part, and being now dead, the Right is inveſted in his only Daughter and her Husband [1].

The Bath Water, and all theſe other tepid Springs, are exceeding clear, they have no Steam, except in a cold Morning, or winter Weather, nor do they throw up great Bubbles of Air, as the *Buxton* Waters; the Spring which ſupplies the Bath, comes in at the North Weſt Corner, and falls down in a great Body, with a ſtrong Current, and therefore has no Bubbles but what ariſe from the Air forcibly, carried down by the Water upon the Surface, where it falls; nor is there the leaſt bubbling in any other of the warm Springs, they all glide down from the Hills above, and flow along in clear purling Streams.

The Weights I made uſe of in trying theſe Waters, were the ſame Hydroſtatical Ballance as before; the Thermometer I had here was ſixteen Inches long; the Bore of its Tube was one twenty third part of an Inch; the Spirits in it, in the hardeſt Froſt, were as much hid within the Ball as would fill an Inch of the Tube, when the common Thermometers were thirty below Temperate; in a mild Froſt, the common Thermometer being at twenty or twenty two below Temperate, this was two eighths of an Inch above the Ball, and in the hotteſt ſultry Weather, the Spirits of this, in common Water, were two Inches and two eighths above the Ball. *September* 17, at eight in the Morning, the Air very thick and foggy till ten a Clock, a briſk South-weſt Wind, the Night before clear, with remarkable *Auroræ boreales*, the Spirits in this Thermometer ſtood at one Inch ſeven Eighths in the River *Derwent*, removed thence into the Bath, and ſtanding there half an Hour, they roſe to four Inches and two Eighths. This Water is about a Penny-weight in a Pint lighter than common Water, and *Derwent* is lighter than moſt common Water, tho' I tried it in the Cool of the Morning.

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[1] Dr. *Medley* wrote a ſmall Treatiſe on this Water in 1730. wherein he Diſcourſes firſt on Water, then on the tactile Qualities; next gives a whole Tranſcript from Dr. *Wainwright* on the Effects of cold Bathing, which he would very artfully apply to *Matlock* tepid Bath, but with a wide Difference, every common Reader muſt be appriſed, who conſiders the Effects of the cold Bath, and tepid Immerſion; and laſtly, concludes with ſome hearſay Stories which he had from *Wragg* the Landlord of the Place, and a particular Obſervation about a Man from whom, he ſays, was taken a Hogſhead of Blood. Then a few Reflections are added to ſeveral of his Obſervations, on the uncharitableneſs and injudiciouſneſs of Phyſicians in general, who had tortur'd ſo many Patients both in Perſon and Pocket without any ſervice till they came to *Matlock*. He pretends to account for the Effects of this Water from this one Reaſon, *viz.* That in all reſpects it is of the ſame Nature, and conſiſts of the ſame Principle with *Briſtol*, but if you expect any Proof hereof, mum for that, not one Voucher.

The Bath Water new taken up, is curdled with Soap, and does not waſh well, but ſtanding two or three Days, it waſhes better than the beſt common Water; it incorporates and boils well with Milk, curdles a Solution of Silver, and lets fall a white Sediment on the Bottom and Sides of the Glaſs, makes it white below, and purpliſh above, and round the Sides. Solution of Sugar of Lead changed it milk white, then curdled and let fall a large Sediment; with Oil of Tartar it was pale and white, with Spirits of Hartſhorn a pearl Colour; Spirits of Vitriol and Sulphur occaſioned a ſtrong Commotion, with much bubbling, left the Water exceeding clear, and the Sides of the Glaſs covered with Air bubbles; with Syrup of Violets, it firſt turned blueiſh, then greeniſh; with Syrup of Cloves, whitiſh; with Tincture of Logwood, a fine Red; with Tincture of Galls, a muddy Green Tea Colour; Red Roſes and Oak Leaves cauſed no Alteration in it. *September* 19, I repeated the ſame Experiments by Candle-light, and let them ſtand ten Hours; when I dropt the Tincture of Galls and Sumach upon the Water, it was a fine purple Colour, which gradually went off again as the Tincture diffuſed it ſelf: next Morning I found the Glaſs of Water with Solution of Silver had a large Sediment, as above, that with Tincture of Galls was of a Sack Colour at the bottom, with a purple Scum at top, and blue for half an Inch under it; that with Tincture of Logwood was of a deep reddiſh Brown, the reſt were intirely the ſame as before. *October* 30, I made the like Trials at home, when the Water had been carried ſixteen Miles, and ſtood five Days, the Succeſs was as follows, *viz.* Solution of Silver made it firſt white, then preſently of a lead Colour; after twenty Hours ſtanding, the Liquor was clear, with a black Precipitation, but had a purple Caſt in another Day; with Tincture of Rhubarb, it was of a reddiſh Yellow; whitiſh with Solution of Sublimate, having a Scum upon it of a light blue and red; with Solution of Sugar of Lead, it was firſt of a milky White, then became very clear, and let fall a large white Sediment both on the ſides and bottom of the Glaſs; Oil of Tartar, gave it at firſt a pale Whiteneſs, but it was ſoon perfectly clear again, with a white Sediment like a piece of Gold-beaters Bladder; the acid Spirits produc'd the ſame inteſtine Motion and bubbling, as before; Spirit of Hartſhorn had the ſame Effect as Oil of *Tartar*, only its Sediment was like a little Wool or Cotton; Tincture of Sanders made it yellow between the Eye and the Light, but a fine blue ſideway; Tincture of Brazil gave it firſt a pale light Red, which the next Day was much deeper; Tincture of Logwood turned it a deep dark Red; Tincture of Sumach and Galls changed it to a muddy Colour, with a green Scum, which tinged the whole Glaſs in five Days; Solution of Coperas, two Years old, turned it firſt to a reddiſh Brown, then to a pale Oker, and let fall a reddiſh Sediment; Solution of Salt Peter turned it yellow at the Bottom, pale above and full of Clouds, and then let fall a yellow Sediment. The Glaſs which had the Solution of Silver in it, was changed to a light Purple, when it had ſtood four Days, that with Tincture of Rhubarb had let fall a light yellow Sediment, and thoſe with Syrup of Violets and Galls were entirely Green.

March 8, I returned to *Matlock*, the Day being uncommonly dry, warm and pleaſant for this Seaſon, but very unexpectedly, we had a ſtrong Froſt, and a great Shower of Snow that Night. I had now another ſmall Thermometer, of the ſame Length with the former, but its Bore was only one twenty ſeventh of an Inch; the Spirits at this Seaſon were all within the Ball, and above them a bubble of Air equal to one Inch of the Bore, the larger Thermometer was four eights above the firſt Inch, or ſeven eights above the Ball; the common Thermometer twenty five below temperate. Setting the two firſt in the River *Derwent*, the Spirits in the larger roſe one eighth of an Inch, in the ſmaller they juſt filled the Ball without any Appearance of them in the Tube: Removing them into the Bath, the leſſer roſe to ſix Inches ſeven eighths, the larger to two Inches ſeven eighths; the Bath Water now weighed a Dram in a Pint lighter than common Water, and ſo did that behind the Stable, which raiſed the Spirits in this ſmall Thermometer to five Inches ſix Eighths, and thoſe in the large one to two Inches ſix eighths, (Note the Bore of the large Tube was one eighth of an Inch,) the furtheſt Spring of the warm Well Waters raiſed the Spirits in the ſmaller Tube to ſix Inches two eighths, and thoſe in the larger to two Inches ſix eighths and a half; this was thirty four Grains in a Pint lighter than common Water; the neareſt of the warm Well Springs raiſed the Spirits in both to the ſame Height with that behind the Stable; the middle raiſed the Spirits in the firſt Tube to ſeven Inches, thoſe in the laſt to two Inches ſeven eighths and a half, ſo that this Spring is the warmeſt of all by one fifty ſixth Part, tho' uncovered and expoſed to the Air and Froſt. Twenty Yards Weſt of this is another warm Spring, which I did not diſcover till it was too late to make a Trial of it.

March 11, at ſix in the Morning, having a clear Sky, ſharp piercing Wind, and hard Froſt, I put equal Quantities of the *Bath* and *Derwent*

Waters into two Tea Cups, and ſet them out to Freeze, the laſt began to project its Iſicles in fourteen Minutes, from North to South, the firſt in thirty three, from North-eaſt to South-weſt, theſe were ſharp at the Point like a Dart, till they reached the oppoſite ſide, and then others ariſing from Weſt to Eaſt, and rejoining together, formed the moſt exact and beautiful Cryſtals of Nitre, but the *Derwent* Cryſtals were confuſed, and reducible to no particular Form, ſtretching out from North to South, and from South to North; this was frozen over in forty Minutes, tho' the Sun was up to warm the Atmoſphere, the other in fifty two Minutes. I then took of the Bath Water, and common Water of the ſame Warmth, and ſet both in a Window facing the North, the latter began to freeze in twenty two Minutes, the former had not the leaſt tendency to it in forty ſeven, till I put a handful of Salt under the Cup; its Cryſtals or Iſicles were of the ſame Figure as before. The common Water when frozen was convex in the middle, and the Bath Water concave. The ſame Morning I put two Quarts of boiling Water to nine Quarts of cold Water, and putting the ſmall Thermometer into it, the Spirits, which were got within the Ball, roſe to five Inches. I threw in a Pint more of boiling Water, this raiſed the Spirits to ſix Inches and a half, then I added another half Pint, which raiſed the Spirits to ſeven Inches, the ſame Warmth with the Middle warm well Spring, for here the Spirits in the larger Tube ſtood one eighth below the third Inch; neither of them roſe any higher, but gradually ſunk as the Water cooled. From whence we plainly ſee, that when the common Thermometers have their Spirits twenty five below temperate, five Pints and a half of boiling Water put to nine Quarts of common cold Water, at the Diſtance of fifteen Minutes from pouring in the firſt two Quarts, makes the exact warmth of this middle warm well Spring. I forgot to mention in its proper Place, that Croilſtone powdered and put into the warm Water, had no ſmell, it changed Silver to a Copper Colour, yet altered not its Solution: But four Parts of Croilſtone and one of Brimſtone powdered together and put into warm Water ſmell'd ſtrong of Sulphur, turned Silver of a Copper Colour, and made Solution of Silver, and Sugar of Lead, jet black, and let fall a large black Sediment, when this mixture was boiling hot all theſe Symptoms were much increaſed: black Limeſtone Powder mixed with one ſixth Part of Brimſtone and infuſed in warm Water neither ſmell'd much, nor ſtained Silver, or alter'd its Solution, but when ſet over a ſmall Fire a few Minutes, then it ſtained Silver, turned its Solution brown, and when boiled four Minutes it made this Solution black. But this Mixture with burnt Limeſtone ſtunk immediately, and had an intolerable Smell when ſet over the Fire, its Steam turned Silver firſt of a Copper Colour, and then black, it made the Solutions of Silver, ſublimate, and Sugar of Lead, a raven black, and preſently precipitated the Sulphur and Metals; even the fourth Decoction of Water on theſe Materials ſtunk intolerably, and diſcoloured Silver.

June 7, being one of the hotteſt Days we had in the whole Summer, I took two Thermometers, (the bore of the ſmaller was one twenty ſeventh of an Inch, the Bore of the larger one twenty third,) and ſet them into the Bath, at nine at Night the Spirits in the ſmaller Tube roſe to eight Inches and three eighths, thoſe in the larger to ſeven Inches and a half; in the Spring behind the Stable, the Spirits in the ſmall Tube were at eight Inches one eighth, in the larger at ſix Inches ſeven eighths; in common Water, the Spirits in the firſt were at five Inches ſix eighths in the laſt at five Inches and a half. The next Morning at five a Clock, the Spirits in the ſmaller Tube ſtood at one Inch above the Ball, in the open Air, thoſe in the larger at two eighths, below the third Inch; ſet in the *Derwent* the firſt roſe to four Inches three fourths, the laſt to five Inches three eighths; The Spring behind the Stable raiſed the Spirits in the ſmall Tube to ſeven Inches one eighth and a half, thoſe in the larger to eight Inches and one eighth: The firſt warm Water raiſed the Spirits to ſeven Inches and ſeven eighths, the ſecond to eight Inches and a quarter, in the ſmall Tube.

September 17, I exhaled ſix Pints and a half of this warm Bath Water, and had twenty eight Grains of Sediment, exceeding white, which fermented violently with Acids even diſtilled Vinegar, or Lemon Juice, and turned ſyrup of Violets Green.

March 10, 11, I exhaled eight Pints and a half of the ſame Water, and had forty Grains of Sediment, thirteen of which was Salt, and the reſt a very white alcaline Earth; this being calcined in a Furnace, the Loadſtone attracted ſome ſmall Part of it; the Salt laid on a red hot Iron, crackl'd, ſwell'd, and bleb'd a little, but did not fly about; it fermented with Oil of Vitriol, precipitated the Solution of Silver, and turned white in Water with Oil of Tartar or Spirits of Hartſhorn, but neither blue, nor Purple with Logwood, or Sumach: I purified ſome of it from the Earth, diſſolved it again in Water, and ſet it by to cryſtalize, it ſoon projected Cryſtals of Nitre and Marine Salt, the firſt in greateſt Plenty. Eleven Quarts of that Water which is next above the warm well Springs exhaled, left five Scruples and four Grains of white Sediment, which was of the ſame Alcaline Nature with the other. Its calcined Earth was ſome Part of it attracted by the Loadſtone; its Salt which is one half of this Sediment cryſtalized, with ſome Difficulty into Nitre and Marine Salt. Twenty quarts from the Spring behind the Stable afforded one hundred and fifty four Grains of white alcaline Sediment, twenty five of which was Earth, twelve Quarts of the middle warm Well Spring left ninety three Grains of Sediment, forty whereof was Salt, nitre and marine; fourteen quarts of the farther Spring exhaled, left ſix Scruples of Sediment, fifty Grains of which was Earth; ten quarts of the warm Water out of *Balls-Eye* left ſixty Grains of Sediment, forty of which was Earth, the reſt Nitre and marine Salt; fourteen Quarts from the Cobler Shaft left one hundred and two Grains of Sediment, forty five of which was Salt. All theſe Sediments were white, all of them contained ſome Particles which anſwered to the Loadſtone, all were very Alcaline, and the Earth of them very rough.

1. From the preceding Hiſtory and Experiments, it is ſufficiently apparent, that the Soil and Vegetables of this Place are warm, tho' it ſtands high, and expoſed to Northern Winds. 2. And that the Waters, which are very clear and light, contain but little Earth, for the whole Sediment is to the Vehicle, but as one to 1536 (that is, 10 Grains to a Quart) and therefore the Earth, excluſive of the Salt, is but as one to 2268, ſuppoſing two parts of the Sediment to be Earth, which is a greater Proportion than this and ſeveral other warm Springs will allow. 3. The Earth of this Mineral Water is of a more attractive and petrifying Nature, than any other that has yet been diſcover'd in *England*, as is evident from the large Heaps or rather Mountains of Petrefactions we find here. 4. And yet it is plain, that this power of Attraction either acts not at all, or very inſenſibly, while the Waters retain their Warmth and Motion, or while theſe Particles of Earth are mixt with a large Body of Water, which prevents their Influence on one another, for we find few or no Petrefactions in the Springs and briſker Streams; but where the Waters have loſt much of their Warmth and Motion, there the Neighbouring Earth ſtrains off the purer Element, and draws to itſelf the groſſer Particles, which are then got within the proper Sphere of Attraction. 5. Whence it is alſo manifeſt, that this Earth muſt exiſt, and be mixed with the Water, in very ſmall Particles. 6 And from their ſtrong attractive Force, we may conclude, that their Figures are moſt likely to be ſpherical, as there is the greateſt Solidity under this Surface, and therefore the ſtrongeſt Attraction, and what renders this more probable is the hardneſs and weight of the Petrefactions themſelves. 7. But whatever their Form or Figure be, they appear to be only Limeſtone-Earth; for a piece of theſe Petrefactions when thoroughly burnt, and put cold into Water, will make it

bubble and ſmoak like unquenched Lime, it ſoon loſes its former hardneſs and figure, and falls down into a white Powder. 8. Theſe Petrefactions, I ſay, appear to be only Limeſtone-Earth by this Experiment; but taking a Piece Three-penny-weight and ſix Grains, and thoroughly heating it in a ſmall Fire, it was ſtill hard when I took it out, and was One-penny-weight and ſix Grains lighter than before; a Piece Eight-penny-weight, having lain an Hour in a ſtrong Fire, loſt Five-penny-weight, it taſted Nitrous, and communicated the ſame Quality to the Water when it was fallen down, and had ſtood half an Hour. None, I ſuppoſe, will aſſert that this was Earth and Salt, which was loſt in the Fire, and Phlegm or Water it was not, for the Petrefaction had lain a Year in a very dry Place; therefore it muſt be Sulphur, which being conſumed by the Fire, the Earth had loſt its Coheſion when put into the Water, and ſo fell down in a white Powder: That mere Earth gave this Nitrous Taſte is improbable, and the other Principles being gone, it muſt be Salt: Nor can we imagine that this Salt was the effect or product of the Fire, ſince it was but a little time there, and differ'd from the Taſte of *Aquæ calcis*, nor will the Infuſion of another Stone or Earth, when burnt, communicate the ſame Nitrous Taſte to Water; from whence I conclude that theſe Petrefactions conſiſt of Limeſtone-powder, Nitre and Sulphur, for had there been any Sea-Salt in them, it would certainly have diſcover'd itſelf by crakling and breaking in the Fire. 9. The warm Waters therefore which produce the Petrefactions muſt be ſtrongly impregnated with theſe particular Principles. And that the petrifying Particles are very ſmall, is manifeſt from their penetrating the Subſtance, without deſtroying the Figure of thoſe Vegetables whoſe Parts they have conſumed and waſted. 10. From the Experiments on Caukſtone and Croilſtone calcined, ſince the Solution of Silver, and Tincture of Nephretic-wood turn the Infuſion of the firſt white, we ſee that it affords a Marine Salt; and that the laſt being blue with Solution of Silver, a deep green with Tincture of Nephretic-wood, a deep red with the Tincture of Rhubarb and Logwood, white, with much Sediment, with the Oil of Tartar, of a deep green, in eight Hours, with Tincture of Galls, contains a Nitre, but of ſo alcaline a Nature by Calcination, that it is the ſame with that of Limeſtone. Here we may alſo obſerve, that the Croilſtone itſelf is a kind of Limeſtone, ſince it becomes white with burning, whether it was blue or black before, this Colour it derives from the Sulphur which is conſumed in the Fire. 11. From the Trials made on Chertſtone, both crude and calcined, it is plain, that this communicates nothing to the Waters. 12. And alſo, from thoſe made on Toadſtone and Blackſtone by Colourations, that they contribute nothing of a chalybeat Principle to their Infuſions; but yet it is manifeſt they afford ſome Nitre, ſince they turn white, and Precipitate with Oil of Tartar and Spirit of Hartſhorn, very red with Tincture of Logwood, and green with Gall and Sumach. 13. The ſaline Efflorescences, and beginning Petrefactions, we are ſatisfied, from the former Experiments, afford, both of them, plenty of Nitre, and the laſt a deal of calcarious Earth. 14. Since the Ore in ſmelting produces a ſtrong blue Flame and Stench, and the Rocks in working emit a greaſy Subſtance, ſince the Petrefactions loſe ſo much of their weight, and the Croil-ſtone becomes white by burning, we have no room to doubt of a plentiful Exiſtence of Sulphur here. 15. And as the Tincture of Galls gives the Water a ſimple Colour by Candlelight, and leaves a Purple Scum upon it, and the Load-ſtone attracts ſome part of the calcined Earth, we muſt allow it to be lightly impregnated with Iron. 16. Since the Petrefactions neither crackle nor break in the Fire, nor their Infuſion, when calcined, precipitate a Solution of Silver, we conclude that they contain no marine Salt, that remaining in the filtered Water, after theſe petrifying Principles are drawn from it. 17. Here then, as well as at *Buxton*, we find that it is a Combination of ſeveral Minerals or Foſſils that warms and impregnates this Water, ſince wherever it is warm, we meet with black Croil, Spar, Cauk, Lead-ore, and Limeſtone, from which, and no other Principles, our preſent Water derives its Warmth, for it fairly appeareth by Experiment, that neither Limeſtone alone, nor Croil-ſtone produces this Effect, but a mixture of both. 18. From the whole, we have proved that this Water contains calcarious Earth, a very little Iron-ſtone, Sulphur in Vapour or Steam, Marine Salt and Nitre, and that there is no ſixth Principle or Ingredient, beſides the fine common Vehicle.

The Differences betwixt *Buxton* and this are, *Firſt*, The laſt contains leſs Sulphur and Mineral Spirit, ſince it is colder and emits not ſuch a Steam; it has leſs Air in its Pores, ſeeing it is heavier, and has no Bubbles riſing up; but it has more of the calcarious Earth and Foſſils in it, ſeeing it curdles Soap, and will not waſh till it has ſtood ſome time, and alſo leaves more earthy Sediment, and parts with more by Solution of Sugar of Lead, and made a ſtronger Ebullition with the acid Spirits.

Theſe Inferences afford us the following practical Uſes. Firſt, here is a moſt pliant, thin, ſweet, dry Air, and alſo all the Objects that can allure and charm the outward Senſes. Of what ſpecial benefit the firſt is in many chronic Diſeaſes, few, that know any thing of Phyſick, can be ignorant; and alſo that the laſt tend to divert and call off the Mind from intenſly dwelling either upon bodily Diſorders, or its own Griefs, and bring on a new ſet of Ideas; for gloomy melancholy Thoughts do not a little diſpirit the Body, affect the Circulations and Secretions, and often occaſion chronic Diſorders, firſt imaginary, then real. 2. Again, tho' the Earth in this Water petrify and attract moſt powerfully, yet ſince it acts not in this manner before it hath loſt both Heat and Motion, and had moſt of the Vehicle ſtrained off in the Earth as a Spunge, then we have nothing to fear from it in our Bodies, where its Heat and Motion are much greater, beſides a number of other Materials mixt with its Parts, which prevent their attractive Force and Influence. 3. And ſince this Earth is of ſuch an alcaline Nature, being only Limeſtone, it muſt therefore be a great ſweetner of acid Humours, and abſorbent of the Acrid, a drier up of too great Humidity and redundant Seroſities of the Animal Juices; for allowing the Water ſhould at firſt encreaſe them, yet it is thinner, and together with theſe its ſaline Parts will be carried off by Urine, whilſt the earthy Parts are retained longer in the Body and anſwer the intent of an Alterative better. 4. But ſhould there ſtill ſome fear remain, that this Water being of ſuch a petrifying Nature, may at leaſt form ſome ſmall groſſer Parts and thence occaſion ſeveral Obſtructions. It may be ſufficient to ſay in Anſwer, That we find no Petrefactions without Nitre, but the Nitre in the Water being changed by the ſundry Actions, Digeſtions, and mixtures in the Body, ſo as there remain no more traces of it; it is not then poſſible for any kind of Petrefactions to happen from this Matter. 5. But as this Earth is not wholly Calcarious, but has a ſmall mixture of Iron-ſtone, it is ſo far aſtringent, helps to bind up the Parts, ſtrengthening the Weak, and ſtraitening the Diameters of the lax Veſſels, for its Particles being ſmall and ſpherical give no ſtimulus, Pain or uneaſy Senſation. 6. Tho' theſe earthy Parts do move, and are equally mixt with the other Parts of the Blood in the larger Veſſels, whoſe Strength is greater, and the Bloods Motion quicker; yet from certain hydroſtatic Laws, firſt the Blood moves with greater briſkneſs in the Middle than at the Sides of the Cylindric Veſſels. Secondly, the groſſer Parts of the Blood being leſs ſuſceptible of Motion than the ſmaller, the firſt will always be in that Part of the Veſſel where the Motion is ſloweſt, therefore in the ſmaller Veſſels, where the Secretions are performed, will the uſe of this Earth be greateſt. 7. This Water having leſs heat, is therefore leſs impregnated with volatile and active Particles, they have alſo more Nitre; hence they thin, heat, and rarefy the Blood, and relax the Veſſels;

ſels leſs than the more warm; it is therefore more ſafe in hectic, plethoric, and ſanguine Conſtitutions, where there is too great a fulneſs of Juices, a quick and ſtrong Pulſe, too plentiful Secretions, a colliquation of the Blood, and a diſtention of the Veſſels.

From theſe Principles and the known Effects of theſe Waters, we conclude, that their primary Uſe, and chief Service of drinking thoſe Waters, is in all moderate ſpittings of Blood, whither from the Lungs, Wind-pipe, or Stomach; as alſo in diſcharges of Blood from the Mouth, Palate, and Gumms, as in ſmall ſcorbutic Ulcers which often infeſt and corrode thoſe Parts; in bloody Urine, bloody Stools, and frequent Hemorrhages at the Noſe; In all inward Ulcers, diſcharging purulent Matter, whether of the Kidneys, Bladder, Ureters, Inteſtines, Stomach, or other Bowels of the Breaſt or Belly; in a *Diabetes*, or too plentiful diſcharge of pale, crude, ſweet Urine, vaſtly exceeding the proportion of Drink taken into the Body, attended with violent Thirſt. In hectic Fevers, with a thin Habit, quick Pulſe, red fluſhing Complexion, eſpecially after eating, or any leaſt Exerciſe, which otherwiſe ſhould only promote Digeſtion, Circulation, Secretion and Evacuation; but in all theſe Caſes we ſtrictly forbid Bathing, as it gives the Blood-Veſſels on the Surface of the Body too great a Preſſure, and thereby throws the Blood too ſuddenly, and in too great Quantities upon the weakened, diſtended or broken Veſſels within the Body, and thereby either cauſes freſh Breaches, or larger Diſcharges, and alſo as it promotes a greater Perſpiration than hectic, lean, diabetic Perſons can bear; and ſince this Water neither heats, thins, nor rarefies the Blood, and ſeeing its earthy Parts have no ſmall ſhare in its Cures; then in a *Diabetes* there is no need of ſuch Caution, with reſpect to the Quantity that may be drank in this Caſe, as is neceſſary about thoſe Waters that are warmer, contain more Spirits, and more rarefy the Blood, ſuch may ſafely and freely drink as much as the Stomach will bear. Indeed weak People, in other Caſes, might boyl it away to one third or fourth Part, and then drink it cold; but then the Vehicle and Sediment ſeparate, as we ſee in its being an excellent Water for waſhing and whitening, when taken up, and ſtood forty or forty eight Hours. But ſome object and ſay, if the earthy Parts are ſo inſtrumental in its Cures, then to powder the Petrefactions is the beſt and ſhorteſt Way to come at what is moſt valuable for this Purpoſe; but this is quibling, ſince they cannot be reduced to ſuch ſubtle and impalpable Parts as they were before in the Water; they will do indeed in ſome Caſes where the teſtaceous Powders come in play, but they are not fit to enter the ſmall Veſſels at firſt; they want alſo the aſſiſtance of the Vehicle, which however overlooked by ſome, is never to be forgotten. The Sulphur of theſe is alſo now inſeparable from the Earth without the help of a Fire; theſe are wholly deſtitute of the help of the chalybeat Principle; nor will their Salts now ſo readily part with the Earth. Drinking and Bathing agree very well in Gleets, *Fluor albus*, Cancer and King's Evil; but we by all means adviſe the Uſe of bathing in Rheumatiſms, weakneſs of the Parts, Strains, Scurvy, Itch, Scab, and other Diſeaſes of the Skin, as Morphew, livid Spots, *&c.* Drinking is alſo uſeful in want of Appetite, Indigeſtion, and heat of the Stomach and Bowels, for tho' it render the Body coſtive, yet it cools thoſe Parts by its common Vehicle, it ſheaths and waſhes off the ſaline Parts which occaſion that Heat, or takes off any Cramp or Contraction of the Parts, as in bilious Cholicks, where both the Vehicle and Alcaline Earth are of very great Uſe.

Since Bathing here neither heats the Body, nor relaxes it ſo much, it may be allowed from ten to thirty or forty Minutes, as the Patients ſtrength will bear; but ſee it be always upon an empty Stomach; and therefore either early in the Morning, or late in the Evening before Supper but the firſt is beſt, before Light and ſolar Rays have too much diſſipated the Spirit of the Bath; let the Body be well dried and rubbed after it, and gentle Exerciſe uſed to promote Circulation and Perſpiration. I hope in any kind of unnatural Diſcharge of Blood, I need not precaution the Patient againſt much, but eſpecially violent Exerciſes, which may heat the Body, and encreaſe the Bloods Motion and Force againſt the Veſſels. In hectic Fevers, inward Ulcers, Atrophy, and Blood-ſpitting, I ſhould adviſe the Waters either to be drank with Milk, or a Milk-diet to be uſed with them, and forbid the Uſe of all ſpirituous Liquors, as Wine, Ale, Punch, but eſpecially Drams of any kind of Spirits: Nor is it proper in theſe Caſes to allow Meats of heavy Digeſtion, which require much Time and Force to carry off, or heat the Body much, or quicken the Pulſe, as Gooſe, Turkey, Duck, Salt Meats, Cheeſe, Beef or Mutton; but above all hot Pickles, Aromaticks and Sauces, are all contrary to the Intentions of this Water. In Hectics, Butter-milk drunk can never be enough praiſed and admired. The Waters ſhould be drank in the Morning, the ſooner the better; three or four Pints here may be allowed each Forenoon, Breakfaſt about eight o'Clock on Bohea Tea, Chocolate made ſmall, or a thin Chocolate made of the weakeſt Bohea Tea, or on Milk; in ſome Caſes Green Tea or Coffee may be allowed. Dine at one o'Clock, and Sup between ſix and ſeven, or ſeven at fartheſt, on things of eaſy Digeſtion; and going to Bed, I ſhould adviſe drinking half a Pint of Water. The

Drinkers will find it neceſſary to remit ſome Days, to prevent the Waters palling the Appetite, inducing a Faintneſs, Indigeſtion and Diſpiritedneſs; and having once entered upon a Courſe of theſe Waters, nothing but great neceſſity ſhould allow the Uſe of any evacuating Medicines, for they often prevent their good Effects, and always retard them; but as it is impoſſible to give particular Directions, ſuited to all Caſes and Conſtitutions at all Times, ſo theſe general Directions ſhall ſuffice, only theſe Waters may ſafely be uſed by all Ages and Sexes, even in the hotteſt Seaſon, without danger. Both the kind of Exerciſes and their Degree muſt be ſuited to the Seaſon, as gentle Riding, eaſy Walking, bowling, Billiards, *&c.* and for Diverſion, Cards, Muſick, Cheerfulneſs, Cheſs, *&c.* but all at proper Hours, innocently and moderately.

From *Matlock* to *Middleton Bath* is two Miles South-Weſt; this riſes up cloſe by the South Side of *Bonſal Brook*, at the Foot of a very high, ſteep Mountain, which conſiſts chiefly of Limeſtone, with ſome Lead Ore, a little Copper, Blackſtone, *&c.* little or no Shale, Braſil, nor *Lapis Calaminaris:* This Bath is a long Mile from *Middleton*, (both being Part of the Eſtate of that worthy and ingenious Gentleman *John Gell*, of *Hopton* Eſq;) and two Miles from *Wirkſworth*; it is ſixteen Yards long, ſeven broad, and two deep, in the middle of a very irregular Figure; it immediately empties itſelf into the Brook by it, throwing out a prodigious and incommenſurable quantity of Water, it cannot diſcharge leſs than three thouſand Gallons in an Hour, it is continually bubbling up in a very fierce Manner; but when the Brook is full, the firſt is ſwallowed up of the laſt, till it falls, then the Bath appears again. The Stones in the bottom are exceeding clean and white, the Water clear and pleaſant taſted, and weighs conſiderably lighter than common Water; it putrifies in eight or ten Days time, but recovers itſelf very ſoon, and never corrupts after. Both Thermometers (*viz.* that the Diameter of whoſe Bore was one twenty third of an Inch, and the other of one twenty ſeventh of an Inch) ſet in the Brook half an Hour, the Spirits in the ſmall Bore were two Inches one eighth above the Ball, thoſe in the larger Tube were three Inches ſix eighths; both ſet in the Bath, the Spirits in the firſt roſe to ſix Inches five eighths, thoſe in the laſt to ſix Inches and a half. This Water with Solution of Silver was a much whiter Pearl than common Water, and very yellow with Solution of Mercury, which changed not the laſt. Oyl of Tartar made the firſt white, but not the laſt. Tincture of Logwood changed the firſt much redder than the laſt. It is great pity that this Bath cannot be more eaſily come at, nor provided with ſuitable and neceſſary

Accommodations, for its mineral Spirit, rich ſulphureous Vapour, thinning, heating and drying Qualities are capable of producing far greater and nobler Services than it has for ſome Ages been put to, *viz.* curing of mangey Horſes and Dogs. Three Quarts of this Water exhaled left eight Grains of Sediment, white as Snow, five Grains of it was Salt, which diſſolved and ſet to cryſtalize, it projected Cryſtals of marine Salt and Nitre, of each near equal Quantities; hence it is plain the Effects of this Water depend not on its fixt Parts, which bear ſo ſmall a Proportion to the Vehicle as one to between five and ſix thouſand; but chiefly on its Volatile, wherewith it is richly and highly impregnated, fitted to anſwer the Uſe of thinning the Blood, cleanſing the Glands and ſmall Veſſels, diſſolving ſaline, earthy, or too nutritious Concretions, to relax the ſtiff, ſoften the rigid, widen the contracted Solids or Veſſels, cleanſe the Skin, and ſweeten the Blood. Hence its uſes are chiefly in the Scab, Itch, Morphew, Kings Evil, all defilements of the Skin, Rheumatiſm, Strains, old Aches, Cramps, Convulſions, Pains of any Member before change of Weather, Bruiſes, Lameneſs, Numbneſs and Weakneſs; theſe are the chief Intentions it will anſwer by Bathing; and for drinking warm, it cleanſes the Stomach, gives or encreaſes the Appetite, promotes Digeſtion, thinns the Blood, Chyle, and Lymph, prevents Obſtructions, inſenſibly waſtes hard Tumours; but does miſchief in hectic Fevers, waſted and emaciated Bodies, is bad in Conſumptions, ſpitting of Blood or other Hemorrhages: or in a rarefied State of the Blood, or where the Pulſe is very quick, the Uſe of it ſhould be attended with the above Rules.

Two Miles from this and three from *Matlock* is *Wirkſworth*, where inſtead of Springs we have two warm Brooks, one on the Eaſt Side, the other on the Weſt Side of the Town, they both being a beautiful tranſparent Water, which tinges not their Streams nor Springs, are conſiderably lighter than common Water. That on the Eaſt Side of the Town is a Sough or Level a Mile long, made for carrying the Water from their former Lead Works; where it appears firſt to the Day, they have made a very convenient Bath. There was formerly here a very good warm Spring, but by ſinking ſo many Shafts in Queſt of Lead, they loſt it and moſt of their cold Springs. On this Side of the Town, there is firſt Corn Mould from four Foot to two Fathoms, then Shale or Lime-Stone, then thin Beds of Clay, under which lie Cauk Spar and Ore, and ſometimes all a Vein of Spar. The Sough on the Weſt-Side of the Town made in Search of Lime-ſtone about one and forty Years ago, where the Workmen began at the South End of the Town, and carried the Level cloſe up the Weſt Side and found no Lime-ſtone, but when they had carried their Sough about two hundred Yards, (being then nine Fathom under Ground) they came to very much Lead and a ſtrong Current of warm Water from the North Eaſt Side, and another ſmaller Current of cold Water from the South Weſt, both which met in the Bottom of the Shaft, and made a tepid Water. They had before this much intenſely cold ſhale Water, which ſo chilled the Workmens Feet and Legs, that they could not bear it without a Fire. The ſmall Thermometer in a hot ſummers Day, having its Spirits up at four Inches in the open Air, and at two Inches in common Water, they mounted up to ſix Inches here in both warm Brooks. Six Gallons of this Water exhaled left five Scruples fourteen Grains of Sediment, fifty five whereof was white Earth, the Salt cryſtalized into marine and nitre Cryſtals. Here is much *Lapis Calaminaris* got, but none near ſo deep as the Riſe of the warm Waters; this conſumes all Lead near it, and if the Workmen find much of this they loſe Hopes of Lead, and we find no warm Waters in this County but where there is Lead. Theſe Brooks being ſo full of ſmall Lead Ore ever ſince they were Soughs, there is therefore no Uſe to be made of them inwardly, only outwardly they ſerve for a tepid Bath.

From *Wirkſworth* come we to *Stony Middleton*, which is nine Miles South Weſt of *Sheffield*, eight Miles from *Cheſterfield*, as much from *Buxton*, and nine from *Matlock*. This Village ſtands on the North Eaſt Side of a ſteep Hill, at the Foot of which is a large Brook, on the North Side whereof is a much higher and ſteeper Mountain, being a Mile and a quarter from top to bottom. The Situation is very Romantick, the Ground all very dry and pleaſant, the Water good and ſweet, being ſtrained through thoſe large Mountains of Lime-ſtone; the Air pure, thin, wholeſome and very fragrant in Summer, and at a little Diſtance ſeveral fine Groves of Woods; all about beautiful Graſs and Corn Fields, along the Sides of thoſe high Mountains. From Eaſt to Weſt on the Side of this Brook, runs a very High, long Ridge of Lime-ſtone Rocks full of ſinous Grottoes, ſeveral whereof communicate with one another and run into the Mountain above. [a] At the

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[a] The higheſt of theſe Rocks is called the windy Torr, from the Top of which, to the Mouth of *Boſſen Hole*, (*Boſſen* in this Country Dialect is *Badger)* is fifty five Yards perpendicular, and thirty Yards below the Hole to the Brook; the Entry to this Cave is a ſmall foot road, about a Yard broad, like a Walk in the Middle of the Rock, the Entry in is of the ſame Breadth and five Feet high, an excellent Shelter for Sheep in northerly and eaſterly Blaſts. About eight Yards within turning to the left Hand, you climb a ſteep Rock five Foot high, where you find one Cave turn to the Right, another to the left Hand, about a Foot high and a Foot broad, the Stone

Foot of this high Mountain on the North Side of the Town, riſes firſt the drinking warm Spring, out of a Rock and falls down on the Earth below, but having no Baſon to receive it, it cannot be meaſured without a great deal of trouble, however it cannot ſend forth leſs than twelve hundred Gallons of Water in an Hour; it weighs lighter than common Water rarefied by the Sun's Heat in an exceſſive hot Day, wherein the Spirits in my Thermometers were up at eight Inches, and put into the Brook, the Spirits in the ſmall Bores ſubſided to the ſecond Inch, and theſe in the large to two Inches five eighths; both ſet in this drinking Water, the Spirits roſe again to one below ſix. The Bath is about eight Yards South Weſt of this Spring, it is encloſed with a Wall four Yards high, four Square, ſix Yards every Way, on its in-

Stone on each Side is Toadſtone, theſe are paſſable about thirty two Yards each, and then turns ſo narrow you can follow it no further. A little Weſt of this is *Charleſwork*, this has a Majeſtic Appearance, lies at the Foot of a very ſteep Rock, ninety three Yards High, and five Yards above the Level of the Brook, its Entry is ſix Yards high and eight wide, here you walk on for fifty two Yards and a half, where you arrive at an unpaſſable deep ſtagnant Lake, this Cave reaches quite through the Mountains and opens into *Eynedale*, which is above half a Mile; by another of its Grottoes, it opens near *Fowlow* which is a Mile and a half, paſſing quite under *Eyan* Church. Forty four Yards above this, is the Entry into *Bamforth Hole*, which is forty nine Yards from the Top of the Rock, and as much from the ſmall Brook; the Entry is five Foot high, then you go down one ſhoulder foremoſt for forty Yards, then riſe up thirteen Yards; in all this Way it is not above a Yard Wide, and at laſt climb a Step ſix Foot high, where you enter the Middle of a large Cave, which extends it ſelf before and behind, here your Toil is rewarded in ſeeing great Variety of Stalactitious Petrefactions. But leaving the Cave behind, go twenty five Yards forward, you are introduced into a moſt magnificent ſubterranean ſtate Room nine Yards wide, and two high; the moſt ſtately, and awful Dome I ever ſaw, its Roof Floor and Sides are all ſhining with endleſs Numbers and Variety of beautiful tranſparent Statues, with ſeveral regular Ranks of fine Pyramids, and other curious Figures, ſome upon Pedeſtals, others reaching the Roof, others wiſhing to ſupport this Reproach of Art, as afraid that Time might ſpoil the Glory of this ſolemn Dome, reach from the Roof to the Floor. In the Middle of this Room is a Baſon three Yards long and two wide, on each Side of it is a ſtately Pillar of *Stalactites*, one fine poliſhed Marble and another in the Middle upon a Pedeſtal, through the Bottom of this is a very ſmall Paſſage a few Feet down into another Entry to ſeveral other Caves ſtill lower. The Roof of this Vault is beautifully adorned with all Kinds of Shells here generated and generating of ſundry Colours, and no leſs Beauty and Variety, interwrought with many other curious Figures. A little beyond this is a fine ſtone Pillar ſupporting the Roof. On the right Hand of this Cave, are Openings into two others at ten Yards diſtance. I went three hundred and ſixty four Yards into this Cave, the ſame Entertainment and Curioſity all along, and many other Caves going off on all Sides, and ſaw no End of them, but they going on under the whole Mountain like Coney-burrows.

ſide is a ſtone Walk round the Bath, it is open above: The Thermometers put in here, the Spirits roſe to ſix Inches one eighth, the Water bubbles up continually with great Force in all Parts as in *Buxton*; it is a very large and plentiful Spring, every extraneous Body fallen into it in a few Days appears very blue, but taken out, it is white in the Air; then we have three perpetual bubbling warm Springs cloſe by the Weſt Side of the Church Yard, each whereof raiſed the Spirits in the Tubes to ſix Inches; *November* 27, being a hard Froſt for forty eight Hours before and a little Snow, I took the Thermometer which I had uſed there the Summer before (the Diameter of its Bore being one twenty ſecond of an Inch) whoſe Spirit the Warmth of this Water had raiſed to one eighth above the third Inch, tho' theſe by the Church Yard made the Spirits ſubſide to two Inches and a half, being about eighty Yards nearer the Town and farther from the Mountain, in which Courſe it cooled more than the firſt Spring and Bath; but in the above Froſt, the Spirits in the Thermometer being only one eighth of an Inch above the Ball, ſet in the Bath, it raiſed it one eighth below the third Inch, the drinking Water two eighths above the third Inch. So that this Water in froſt or cold Weather, is one twenty ſixth Part warmer than in Summer, and the increaſed Heat of the Springs by the Church Yard Side in Summer equal to the Warmth of the other two, is from the Earths Surface above them heated by the hot Weather, and the Heat and Rays of the Sun reflected by the Stone Walls near them upon the Water. This Water weighed fifty Grains in a Pint lighter in Winter than common Water.

The Lime-ſtone here ſeems one Maſs of Shells, but all of the cockle and oyſter Kind, all Bivalves and Peclinites, and that theſe are not the *Exuviæ* of thoſe Fiſhes left there by the Deluge, is plain firſt from the prodigious Quantities of them both here and five Miles about. Secondly from thoſe in *Bamforth* Hole, which are daily forming and growing. There is alſo ſome black Lime-ſtone here, which upon breaking ſends forth a ſtrong ſmell of Sulphur. It is remarkable that in the lead Mines on the other Side of the Mountain above thoſe Springs and about two Fathoms above the Lead Ore, was a Bed of *Boulder* Stones, any one of which being broken it contains from half a Pint to a Gallon of ſoft *Bitumen* like *Barbadoes* Tarr, it melts before the Sun or Fire to Oil; there were alſo ſeveral Springs in the Mines, that took Fire with a Candle and would burn a Week or Fortnight, and all the Water drilling through this *Stratum* of *Boulder* Stones will take Fire and burn many Days. This Bed was continued between two and three Miles, all along *Hucklewedge* with its burning Waters. Several Damps have happened in theſe Mines without any preceeding viſible Cauſe or Signs, but all being ſerene and clear in the Works without Fog or Miſt; the Sulphur in the Air would fire at the Miners Candles, the Flame run from one End to the other, with a thundering Noiſe, making the Earth ſhake, and in two Moments the Sulphur was ſpent, the Fire extinguiſhed of it ſelf, and all clear again. The only Shift the Workmen have is to clap down on the Earth inſtantly on their Faces till it is over; ſometimes ſublimed Flowers of Sulphur gather on the Stone Roof over the Candles, take Fire and burn violently; and this is the moſt furious Fire Damp they have, ſcalding the poor Fellows almoſt to Death: On the North Side of this Mountain, almoſt oppoſite to theſe Springs is a Mine which cannot be wrought; for in picking or ſtriking the Ore, the ſudden ſhaking of the Metal gives ſuch a violent Motion to the Sulphur, that it makes an Exploſion like fired Gunpowder, or a Blaſt in a Rock, ſo as great Lumps riſe up and fly about along with a Kind of *Terræ motus*, or Earthquake. The firſt Diſcovery of the above *Stratum* of *Boulder* Stones happened by a Workmans breaking one of them in raiſing it, the outſide was only a Shell of Stone filled with a ſoft Matter, wherein he put down his Candle, which burning down to this Subſtance, it melted and burnt; what remained he took Home, took it out of the Stone into a Saucepan and melted it; then it was an exceeding fine clear Balſam without Smell, except thrown into the Fire; but when cooled again, it hardened like fine Fat; ſeveral others of thoſe Stones they broke and found them full of this Subſtance, wherewith they provided the Neighbourhood a pretty Time for greazing Boots and Shoes, till they found it quickly ſhriveled them up and burnt them to pieces; great Pity ſuch a fine *Bitumen* or *Oleum Terræ* had been thus waſted.

All theſe five warm Springs are of the ſame Kind, and produce the ſame Colours upon Examination, for they brighten the Solution of Gold, Solution of Silver turns them firſt of a deep Pearl blue, then white and a large Sediment is let fall. Solution of Copper turns them of a greeniſh Blue. Solution of Sugar of Lead firſt of a Pearl White, then clear with a dark Sediment; Oil of Tartar of a fine Pearl, then a ſmall Sediment. Syrup of Violets firſt of a whitiſh Blue then greeniſh. Tincture of Logwood of a pleaſant ſcarlet Red, Galls of a muddy White, the acid Spirits raiſed a ſtrong Commotion or Ebullition in it, and Rheniſh Wine mixt with it occaſioned a great inteſtine Motion. Fifteen Pints of the Bath boiled away left ſixty nine Grains of Sediment, thirty four whereof was Salt, the reſt Lime-ſtone Powder. Sixteen Pints of the drinking Water exhaled left ſeventy Grains of Sediment, one half whereof was Salt, the reſt calcarious Earth. The Waters near the Church Yard Side exhaled left near the ſame Quantity of Sediment, their calcined Earths were ſcarce influenced by the Load-ſtone, that of the drinking Water caked like Sea Coal, and was very Light. Theſe Sediments fermented much, ſmoaked and boiled with Acids, turned Green with Syrup of Violets, and ſent forth a volatile Smell or Spirit with *Sal Armoniac*, the Salts crackle and fly on a red Hot Iron, and ſwell and boil. Made into a *Lixivium* they project Cryſtals of Nitre and Marine Salt. This Water and *Buxton* will keep a Fortnight in Summer without ſtinking, *Matlock* twelve Days, *Middleton* Bath Water not above ten Days. It is a Miſtake that Mr. *Leighs* Water will not corrupt, for I have had it as bad as any of the reſt.

Since this Water comes to us naturally warm, and there is no natural warm Water but what has waſhed ſeveral metallic or mineral Bodies of different Natures, amongſt which, upon their Mixture, has happened ſome Conflict, Ebullition, Fermentation, inteſtine Commotion or Diſſolution (or whatever other Name ſome pleaſe to call it by) of ſome Parts and Mixture thereof with the Water, for we find that there is no ſuch thing as making Water warm without the Addition of ſome other Body or Element, or violent Motion (if that will do it) for if it is heated over the Fire or by the Sun, here is the Addition or Mixture of Particles of Fire, fewer or more; but our Water having a natural Warmth, we ſay it contains theſe ſubtle Parts, which were the Effect of this Conflict and Mixture; but theſe Parts being incoercible and unretainable, after the Warmth of the Water is gone, we therefore call them a mineral Spirit, Vapour, or Steam. But we having traced, and being ſatisfied of the ſubterranean Exiſtence of Lime-ſtone, Lead Ore, a little Iron-Stone, and a very few ſmall Marcaſites of Copper, we therefore ſay this Water waſhes and is impregnated by theſe, tho' we pretend not to determine their Mixture and Quantities to one another in theſe Dark and inacceſſible Receſſes. We ſay again that the Water by the Church Yard being naturally cooler than the Bath, and that not quite ſo warm as the drinking Water which riſes up to us at the Foot of the long Deſcent of this Mountain, at a conſiderable Diſtance from its Origine and impregnating Principles, whereby much of the Heat and mineral Spirit is loſt in a long Maze of Clifts, Earth and Crannies; therefore could we come nearer its Origine, we ſhould have the Water much warmer, tho' we preſume not to tell its exact Heat even there. Moreover ſince all theſe Minerals abound with Sulphur, and not only with groſs inſeparable, but even Sulphur of ſuch a fine minute Nature, as its Steam mixes with common Water ſo as to take and keep Fire ſo long, and ſince whole *Strata* of Stones contain of this liquid *Bitumen*, and ſome of the Shafts cannot be wrought becauſe of it, therefore I ſay there is alſo Sulphur in this Water, tho' neither diſcoverable by Smell, Taſte, nor tinging Silver or its Solution, &c. It is plain alſo from the perpetual and ſtrong bubling up of this Water, that it contains very much Air in its Pores, in which Air among the Pores of the Water is lodged this mineral Spirit. But beſides this Air, Spirit and Sulphur, upon boiling away any Quantity of the Water, you have a Sediment remaining, which we therefore call fixt Parts. But a Part of this Sediment being neither diſſolvable in Water, nor calcinable or conſumable in Fire, we therefore call this Earth; which Earth raiſing a violent Fermentation with Oil and Spirit of Vitriol, Spirits of Nitre, Sulphur and Salt, and turning Green with ſyrup of Violets, we ſay it is neither acid nor neutral but Alcaline. Again, this Mountain in all Parts abounding with Petrefactions produced by the Lime-ſtone, (as was proved before) and this Earth being of the very ſame Nature, and producing all the ſame Symptoms and Effects with the calcined Petrefactions ſtript of their Salt, we therefore ſay that this Earth is chiefly Lime-ſtone Powder. Again ſince a Part of this Sediment is diſſolvable and paſſes the filtering Cap clear with Water, and a Powder remains after boyling away this filtered Water, and this Powder having a ſaline pungent Taſte, we ſay it is Salt. But one Part of this Salt precipitating Solution of Silver, crackling and flying upon a red hot Iron, ſmelling Urinous with *Sal Armoniac*, fermenting with Acids, and projecting upon Cryſtalization Cryſtals like Dice of a cubic Figure, we ſay this Part is marine Salt; but another Part of this ſame Salt turning Purple with Solution of ſilver, red with Tincture of Logwood, green upon long ſtanding with Tinctures of Galls and Sumac, cryſtalizing into Nitrous Cryſtals, &c. we therefore ſay that this is Nitre. And ſince the Lime-ſtone which this Water waſhes has mixt in ſeveral Parts with it Marcaſites of Iron, and alſo ſince we find behind the ſame Mountain Iron Stone and Ocre, we may juſtly imagine that there is ſome chalybeat Principle in the Water, tho' neither viſible nor tractable. From the whole we find here a Mineral Spirit, a moſt fugitive Sulphur, a little Marine Salt and Nitre, but more calcarious Earth; the Nature and Properties of each of which conſidered ſeparately in their juſt and natural Proportions, and then mixt give us the Vertues and Uſes of theſe Waters.

Which are thinning, drying, ſweetning, cleanſing and healing; are good if drunk regularly, in any unnatural Sharpneſs and Saltneſs of the

Blood, and Juices therefrom derived, or where the Parts of the Blood are too ſtrong and coherent, or its State too ſizy or mucous, or the Veſſels loaded with Slime, or abraded by Salt Humours, or contracted ſo as the vital Liquor has too narrow a Paſſage; hence it is good in the Heartburn, overflowing of Bile, bilious Cholick, too great Heat and Conſtriction of the Stomach and Inteſtines, Coſtiveneſs, want of Appetite, Palpitation of the Heart, Shortneſs of Breath, from either Stimulation or ſtuffing of the Lungs, or loading of the Blood Veſſels with thick groſs Humours, heat or ſtoppage of Urine (except from a large Stone) or where the Kidneys or Ureters are furred up with Sand, Gravel Matter or Slime. In the Scurvy, beginning great in young People; Cancer whilſt in *Embryo.* Obſtructions of the Glands, Headachs from a fullneſs of the Veſſels with crude Humours. Bathing here will produce cleanneſs of the Skin from its Defedation with Scab, Itch, Blotches, ſlight Kings Evil, Excoriations, Tettars, Ringworms, Scurvy, and Morphew; it will alſo relieve Bodies labouring under wandering, periodic, arthritic or Rheumatic Pains; or Pains or Lameneſs from Strains, Bruiſes, old Fractures or Diſlocations, Wrenches, Falls. It will alſo make its Way into and thinn groſs Humours in the ſmall Veſſels on the Bodies Surface: Hence freer Perſpiration, unloading theſe Veſſels, opens the Pores, promotes Circulation, Secretion, Nutrition and Evacuation; braces up the ſolids firſt, and gives the Humours the greater Shock, then relaxes them afterwards, and gives the laſt greater Space to move in. It helps Cramps, Contractions, and Slight Convulſions.

It may be drunk more freely and ſafely than *Buxton*, as it is cooler, rarefies the Blood and relaxes the Veſſels leſs; but not ſo freely as *Matlock*; ſince it certainly has more Sulphur in it, tho' the ſame Rules in bathing are ſufficient. Theſe Waters may be drunk a Fortnight without intermitting, then reſt four or five Days or a Week, and drink them again, four Pints a Day is ſufficient, and not too much. Their Uſe will not allow mixing Ale, Punch, Brandy, *&c.* with them; nor Foods of groſs Nouriſhment and heavy Digeſtion, nor too violent Exerciſe, nor night watching and revellings, nor ungoverned furious Paſſions, nor Indolence, Idleneſs, and Mopiſhneſs. Bath firſt in the Morning or before Supper on an empty Stomach; the ſooner in the Morning the Waters are drank medicinally the better, before the Heat of the Sun and Day have diſſipated their Spirit, and take them in ſmall Doſes and often, as a third Part of a Pint every half Hour.

As to the different Degrees of Heat in thoſe Waters, and their Proportion to the Blood's warmth, take as follows. *October*, 6, 7, 1732, being on both Days very great Rains, I took two Thermometers, the

Diameter of ones Bore was one eighth of an Inch; this ſet half an Hour in the River in a Flood, the Spirits fell down to and ſtopt at five eighths of an Inch, above the firſt Inch: The Tube removed from this and ſet in the main Spring or the Bath another half Hour, the Spirits roſe to three Inches three eighths and one half of an eighth. From this I laid it to the Breaſt of a young healthy Perſon about nineteen Years of Age, and let it lie above half an Hour, with its whole Ball and lower Part of the Tube compaſſed on all Sides with the naked Skin before a warm Fire in a cloſe Room; the Spirits roſe one Inch and a quarter higher and ſtopt. Hence I ſay that ſince the Bath raiſed the Spirits one Inch and ſeven Eighths above common Water, and the Warmth of the Body of a young healthy Perſon raiſed the Spirits only ſix eighths of an Inch higher; then the Warmth of the Bath is very near three fourths of the Bodies warmth. Again I took a ſmall Thermometer the Diameter of the Bore of whoſe Tube was near one twenty third of an Inch; this ſet in common Water half an Hour with the other, the Spirits ſunk down to the firſt Inch cloſe by the Ball; I then ſet it in the main Spring of the Bath, the Spirits roſe to the eleventh Inch and two eighths and a half. Now if the Bath raiſed the Spirits in the large Tube fifteen Digits, and the Spirits in the ſmall eighty two and a half, then the Spirits in the laſt roſe juſt five eighths and a half to one eighth of the firſt, ſo that had the Tube of the ſmall Thermometer been long enough, the Spirits by the Body's heat in that Situation, muſt have riſen to fifteen Inches three eighths and a half, which is the ſame thing, near three fourths of the Body's warmth. Again, the Spirits in the ſmall Tube ſtopping rather below the firſt Inch juſt at the Ball, in the River, and *Matlock* Bath raiſing it to ſeven Inches and a half, which is near one half of the Blood's warmth or near a *Medium* between the Heat of the Body and Water, or ſeventeen thirty two Seconds of the Blood's Heat, *Middleton* Bath raiſed the Spirits in the ſmall Tube to ſix Inches and a half, that is, near fifteen thirty two ſeconds of the Body's Warmth. *Wirkſworth* warm Brooks raiſed the Spirits to the ſixth Inch, that is, five Inches above common Water, or a little more than thirteen thirty two ſeconds of the Body's Heat. I am informed by a worthy ingenious Phyſician, who was ſeven Weeks at *Briſtol*, that ſeeing the Pump of that warm water near St. *Vincent's* Rock taken up, he examined the Warmth of the Water, which he found to be about five ſevenths of the Blood's Heat; ſo that *Buxton* is warmer than this.

APPEENDIX *on the petrifying Waters.*

THo' theſe be not reckoned amongſt the Claſs of medicinal Waters, yet we ſhall give them a Place here, both becauſe all our warm Waters, eſpecially *Matlock* and *Stony Middleton* are of this Kind, and alſo tho' they have been hitherto overlookt, or at beſt eſteemed as the pleaſant ſportings of Nature, yet we ſhall prove them highly medicinal, and entitled to a Place amongſt the very uſefulleſt or nobleſt Waters or Medicines we to this Day are acquainted with. All the Kinds of Petrefaction performed by thoſe Kind of Waters in this Country may be reduced to thoſe by Incruſtation. But if this be thought by ſome (who always love to run Diviſions) too narrow or comprehenſive a Definition, we ſhall divide them into thoſe by Incruſtation, Exudation, Filtration, and Attraction; having never yet been ſo happy after all my diligenteſt Enquiries, as to find any of thoſe which are ſaid to turn into firm Stone. Thoſe by Incruſtation I call ſuch Waters as leave a Powder upon ſuch Materials as lie in their Way: As Graſs, Leaves, Moſs, Sticks Straws, &c. And of theſe we have two Sorts, *viz.* Such as have a coarſe Powder cleaving to the Surface of thoſe Bodies, without penetrating their Subſtance; and theſe Particles are often ſo groſs that you may rub them off with the Hand, or they moulder to Pieces on bending that on which they lie. Or the Parts are of a finer make and penetrate the Interſtices and ſubſtance of the Matter to which they adhere and fill up even its Veſſels retaining ſtill the original Figure of the Body, nor can this Matter be rubbed off. *Secondly*, thoſe formed by Exudation merely without any Stream or Current of Water, but only from the Dew or Steam that ſweats out of the lower ſide of the Rock, where the ſmall watery Vehicle flies off and leaves the Stone Powder and Salt behind it, to coaleſce and form a hard Body: We have ſeveral Sorts of theſe all exceeding beautiful and of endleſs Shapes, repreſenting great Variety of Parts or whole Animals, Vegetables and ſome Minerals *Thirdly*, thoſe by Filtration, where the Water is ſlowly ſtrained through the ſmall Crannies of great Rocks or Mountains of Stone, by drops, where it leaves a Part of its ſtone Powder on the

Roof like large Icecles, or on the ſide Walls like Plaiſter, on whoſe Surface are the ſmall Furrows by which the Water drilled down, like ſo many diſplays of vegetable or other Bodies; or where the Floor is a hard Stone, which makes way for and drains up the Water, but not the Stone Powder, to which a Part of the Salt adheres: Here as the firſt Maſs or Heap happens to form into any real or imaginary Shape, that which follows retains it. Of theſe Kind of Petrefactions we have ſundry Sorts, as the Sparry exactly like Sparr, only it retains not its Figures, being white, tranſparent, poliſhed and fine; ſuch are thoſe in *Pools* Hole and many in *Bamforth* Hole; the Stalactitious, which are white, clear, and very ſolid, but not tranſparent or like Spar, ſome white ſpongy, very light and brittle, as ſeveral in *Bamforth* Hole, *Peaks* Hole, *&c.* Others a dark brown ſolid, but not very hard. And here give me leave to take Notice of two Errors which have much prevailed. The Firſt is that all thoſe Petrefactions come from Waters warm at their Origine, but cooled in their long Courſe or Stream coming to us; of the contrary we are certain, ſince we find ſuch numerous Petrefactions in *Pools* Hole, *Peaks* Hole, *Bamforth* Hole and many others of thoſe Grotto's, whoſe Roof is not many Yards from the Day, and yet are ſupplied intirely from that Stone and Mould betwixt the Roof and Day, where we are ſure all the Water is cold. We are alſo convinced from the lead Mines beyond *Buxton*, where the Chaſms of the Rocks are wedged up with Petrefactions, which we are ſure are formed out of a Water that never was warm. The other Error is that theſe Waters turn Wood into Stone. I have met with none ſuch, but theſe I have ſeen, which in long time waſte and conſume the Wood and other Vegetables, the Earth gets into the Cavity of their Fibres and Veſſels, fills them up, ſwells and rots the Wood, expels it like a Fungus or Moſs, and aſſumes the exact Figure and Order of thoſe Veſſels and Fibres. This I have met with ſome hundreds of Times, and traced on the ſame Sort of Wood through all its Stages from the firſt Incruſtation, to the ſwelling, tearing, and Expulſion of the Wood like Moſs or Slime, and to the finiſhing the Petrefaction; and this is what I ſuppoſe has been taken for turning Wood into Stone. The fourth Kind of Petrefaction by Attraction, if ſuch may be called a Petrefaction, is a Concretion of Vitriol Sulphur and Earth under the Receptacle of ſome chalybeat Waters from a Solution of ſome ſubterranean Foſſils highly ſtored with Vitriol, which immediately under the Earth's Surface ſubſides and ſeparates from the Vehicle, is attached to any vegetable Body or ſpongy Earth, and becomes a black heavy, nauſeous, ſtinking Vitriolic Maſs, which powdered and infuſed in Water ſends out its Vitriol, the Powder dried, then put into the Fire on a red hot Iron, the Sulphur ſmoaks and flares; but to ſay that theſe Concretions are from a Solution of the Pyrites, is ſaying nothing, till I find the learned fix ſome determinate meaning to the Word, which has been uſed lately in ſo lax a Manner, as to communicate no certain Idea. Beſides theſe learned Men tell us that the Pyrites is diſſolved under Ground, but the Water that diſſolves them brings us no fixed Vitriol, but this Water does afford all this fixt Vitriol, therefore this is no Solution of their Pyrites: Beſides we know that this Water is ſtrained through a thick *Stratum* of Shale of about thirty Yards deep below a thin Bed of Clay. But there is yet a fifth Kind of Petrefaction, which as it is the beautifulleſt of all, ſo we are intire Strangers to their Manner of Generation, and that is, theſe tranſparent, brilliant, ſolid, hard, hexagonal Gems found like ſmall Marcaſites in the Middle of Limeſtone in *Cornwal*, and *Broughton* near *Settle* in *Yorkſhire*, and ſometimes near *Caſtleton* in *Derbyſhire*, which are called Diamonds, every whit as fine as *Briſtol* Stone, and will cut Glaſs. They are alſo found on the Earth's Surface after a ſharp ſhower of Rain near *Buxton* and *Harrigate*. All theſe Petrefactions are generated during the Winter Seaſon, never in the Summer; and the ſtormier and colder the Winter, the larger and harder the Petrefactions; all of them except the fourth Sort are indiſſolvable in Water, but ſome of them, as Sparr, flows and melts to Water in a hot Fire, and the reſt, after a violent Fermentation, are by Acids, as *Aqua Fortis*, diſſolvable to a Gelly. Theſe called Diamonds at *Buxton* are comprized under ten, twelve, fourteen, ſixteen, or eighteen Planes. They are always Hexagons in the Middle, and where they ſlope down to form a Pyramid at each End, under as many or fewer Triangles as there are Sides; hence they have four five or ſix fine poliſhed Triangles. But thoſe found in the plowed Field near *Harrigate*, are not of one certain Figure neither at the Ends nor Middle, being ſometimes triagonal, tetragonal, pentagonal, and hexagonal in the laſt, and each almoſt differing from another in the firſt. In ſeveral of the *Derbyſhire* Grottoes, are Petrefactions ſo like a Gooſe's Quill, that if they lay both together on a Table a Stranger would not know one from the other, both having the ſame Figure, hollow and pith. Were it not for the Brittleneſs of Spar, and its not enduring Heat, there could be no beautifuller Chimney Pieces and Ornaments for Rooms in the World; it is from this Friableneſs that *Aldrovandus* calls them *Gemmæ inchoatæ & non perfectæ*, and ſuppoſes both Gems and them of the ſame Nature: Hence from their peeling off in Shales or Scales *Stenow*'s Opinion ſeems true, that their Growth is by an outward Appoſition of freſh cryſtaline Matter to the external Planes of the already delineated cryſtal, but not all at the ſame Time, nor in the ſame Quantity: Hence the Top Planes of the above cryſtals are not always equal, theſe cryſtals being certainly a fine Kind of Spar. We have Waters whoſe earthy Parts are ſo very ſmall, that they are ſupported by the coldeſt Springs in the chilleſt Air, till they fall upon, and penetrate, and inſert themſelves into the Pores of old ſolid large Oak Roots, and gather by Degrees till they compreſs the Fibres, enlarge their Veſſels and Interſtices, conſume and rot the Wood, ſo as at laſt nothing remains beſides a perfect Stone, of the very Figure and Appearance of the Tree Root, with ſome ſmall Reſemblance of the Lines of the Wood it ſelf; but has loſt its Colour, is very brittle and as incombuſtible as common Stone. In Vinegar it ſends out abundance of Air Bubbles, but wholly diſſolves into a white Subſtance in *Aqua Fortis*, with terrible Fermentation, huffing and ſmoaking. Of this Sort is the Petrefying Water at *Newton Dale* near *Thornton*, which ſome uſe medicinally. On the contrary, other incruſtating Waters I have met with, whoſe earthy Particles are ſo groſs and bulky, that they cannot be long and very far ſupported in cold Water and open Air, but fall down upon the next Body they meet with, and neither penetrate the Subſtance nor enter the looſeſt Part becauſe of the Groſsneſs of the earthy Parts, only gather on its Surface like ſparkling Sand or ſoft Stone, and may together with the Bark of the Stick be ſlipt off like a Sheath; of this Sort is *Ibberſtone* in the Road between *Thornton* and *Scarborough*. But I never met with any Waters which really convert the Subſtance of Wood into Stone, nor do ſuppoſe that theſe Petrefactions are formed of Water turned into Stone, but of the Limeſtone Particles conveyed by the Water either to the Day or into the Fiſſures or Grottoes of thoſe Rocks, and is the ſame Matter that really was contained in the Water before; and tho' all of them are called *Stony*, yet are there not only different Kinds of them in different Springs, but ſeveral Sorts in the ſame Spring.

The moſt noted of the petrefying Waters in *Yorkſhire*, is the dropping Well at *Knareſborough*, which riſes up about fourteen Yards below the Top of a ſmall Mountain of Marleſtone (properly a Limeſtone of a very coarſe Grain) on the Weſt Side of the Town and River, and about twenty ſix Yards from the Bank of the *Nid*; then it falls down in the ſame contracted rapid Stream, about a Yard, and at a ſecond fall at two Yards Diſtance it comes two Foot lower, then three or four, and ſo falls upon an eaſy Aſcent, divides and ſpreads it ſelf upon the Top of an Iſthmus of a petrefied Rock generated out of the Water, there falls down round it; about four or five Yards from the River, the Top of this Iſthmus or Rock hangs over its bottom four Yards. This Rock is ten Yards high, ſixteen Yards long, and from thirteen to ſixteen Yards broad; but on the backſide it is twelve Yards high. This little Iſland ſlipt down and ſtarted from the common Bank about thirty Years ago, and leaves a Chaſm between them from a Yard and a half to three Yards wide; in this Chaſm on the back and lower Side of the Part that is fallen down, are petrefied Twigs of Trees, Shrubs, and Graſs Roots, hanging in moſt beautiful Pillars all interwoven and forming a great many charming Figures: On the other or common bank Side of the Chaſm are whole Banks or Coverings like Stalactites, very hard and inſeparable (without breaking) from the Rock where the Water trickles down from the oppoſite Side. This Spring ſends out about twenty Gallons in a Minute of the ſweeteſt Water I ever taſted; from its riſe till it fall over the common Bank, are ſeveral Petrefactions upon the Stones, but none on the Graſs, *&c.* till it come within two Yards of the bank Top. It ſprings out of a ſmall Hole like a little Sough in the middle of a thick ſet of Shrubs. This little Iſthmus is beautifully cloathed with Aſh, Oſier, Elm, Ivy, *Sambucus*, *Cervicaria major*, *Geraniums*, Wood Mercury, Harts Tongue, Sage, Ladies Mantle, Scabious, Cowſlips, wild Angelica, Meadow Sweet, Hypericon, *&c.* This Water both at the Spring and from the Rocks is of equal Weight, and each twenty four Grains in a Pint heavier than common Water. I exhaled eighteen Pints of this Water from the Spring, and it left ſeventeen Scruples of Sediment; I boiled away nineteen Pints of it as it falls from the ſuppoſed petrefying Rock, and it left twenty two Scruples of Sediment, *viz.* eleven twelfths of an Ounce. This Water with Tincture of Rhubarb turns of a fine yellow Colour; with Solution of Sugar of Lead very white and thick, curdles preſently and lets fall a large white Sediment; with Oyl of Tartar it is white, turns cloudy, and precipitates a white Sediment; tincture of Galls, Sumac, Green Tea and Red Roſes change it not black or purple, but muddy at firſt, and in three or four Days all green. It precipitates not nor blackens Solution of Silver; it is reddiſh with Tincture of Logwood. The Sediment, if boiled in a clear Braſs Pan is white as the fineſt chalk; but if boiled in a Pan much ſullied and blackened, it is greaſy and blackiſh; half an Ounce of the Sediment of the Water from the Spring, put into Water, let ſtand till clear, then filtred, that in the Cap dried and weighed had loſt four Scruples and four Grains, which was its Salt, this filtred Solution boiled to a *Lixivium* and ſet to cryſtalize afforded only Nitre; ſeven Scruples and four Grains of the Sediment from the Rock, left five Scruples and four Grains of Earth and two Scruples of Salt, which was all projected in Cryſtals of Nitre.

The next of Note of this Kind, is *Ball* or *Bandwell* at *Stenfield Lincolnſhire*, a quarter of a Mile from the Spaw, it is a moſt pleaſant ſweet Water, riſes up towards the South in a flat Ground under a Fine Wood at the South Weſt End of a Cloſe, and tho' it ſtinks not, yet leaves much black Sludge, it is neither of a vitriolic Salt, nor tart Taſte, but it crudles Soap or Milk like the dropping Well. This Water with Tincture of Rhubarb is of a light yellow, then becomes darker, with Oil of Tartar Pearl Colour, then cloudy and in a few Days precipitates very much, it is muddy and white with the Spirit of Hartſhorn, with Syrup of Violets green. It is a fine deep Red with Tincture of Logwood, firſt white, then green with Tincture of Galls, ſome of this black Sludge taken out and dried, then thrown on a red hot Iron, ſmoaked, then threw forth a blue Flame in the dark and ſtunk much. A Gallon of the Water exhaled left four Scruples of white Sediment, forty four Grains whereof was Earth, and about thirty Grains of Nitre, and eight Grains of Marine Salt, when cryſtalized.

A quarter of a Mile from this is their bathing Well which is noted for curing Weakneſſes, Aches, Cramps, and all Foulneſs of the Skin, this riſes up into a Stone Baſon two Foot and a half ſquare, in the middle of a great Bog in a Meadow, on a gentle deſcent, it has neither Taſte nor ſmell, but leaves much black Sludge in the Bottom. This Water is whitiſh with Solution of Silver, then purple, green with Tincture of Nephretic Wood, or Syrup of Violets, or Tinctures of Galls or Sumac, white with Solution of ſugar of Lead, Oil of Tartar, or Spirit of Hartſhorn, and lets fall a Sediment, very red with Tincture of Logwood; both this and *Bandwell* fermented much with the acid Spirits. Ten Pints of this boiled away left three Scruples and ſix Grains of white Sediment, twenty ſix whereof was Salt, about ſixteen Nitre, and the Reſt common Salt. Between theſe Wells lies the blind Hole, which riſes up all of a ſudden, boiling up moſt impetuouſly, ſends off a great ſtream of Water for ſeveral Weeks, then dries up of a ſudden again, ſtream and all fails, the Ground is chap'd for ſeveral Weeks again; its Water is of the ſame Nature of the two laſt, it is the moſt unaccountable Spring in this County, and more ſurpriſing than the Ebbing or flowing Well near *Tiddeſwall* in *Derbyſhire*, for it has no Dependence upon Rain or Drought as the other has.

To theſe two petrefying Waters, we may add *Newton Dale*, *Ibberſtone*, one near *Caſtle Howard*, the Seat of the right Honourable the Earl of *Carlile*; one near *Skipton*, with a great many others, of which my Limits will not allow me to write a particular Hiſtory, another at *Kiddal* near the Seat of the Right Honourable Lord *Bingley*, and one near *Wormſley* the Seat of *Harvey*, Eſq;

From the Hiſtory of the dropping Well we ſee, *Firſt*, that this like thoſe of the ſame Kind of the warm Waters, proceeds from Limeſtone. *Secondly*, that it contains great Plenty of Earth, as appears both from Exhalation, and pouring it upon Solution of Sugar of Lead. *Thirdly*, That this Earth is of a very alcaline Nature ſince it Ferments with weak as well as ſtrong Acids. *Fourthly*, That ſince the Water is ſo exceedingly beautiful, limpid and fine, this Earth exiſts in very ſmall Particles and therefore very near to one another in the Vehicle. *Fifthly*, Tho' theſe Particles are ſo near one another, yet they act not upon, or are not within the Spheres of ſenſible Attraction whilſt in Motion, but when the Stream is ſpread all over the Top and Sides of the *Iſthmus*, from which the Water trickles down in large drops round it, then ſome Parts of this Earth adhere to the Rock, and the Reſt fall down ſome upon Graſs, Sticks, Leaves, Straws, *&c.* and leaves its Incruſtation in that languid Motion. *Sixthly*, We ſee that not only Diminution of Motion, and draining off the thinner Parts of the Vehicle, but the Acceſſion of the cold Seaſon, is alſo neceſſary to the carrying on this Work of Petrefaction, ſince there is none of them made in the Summer, but all in the Winter, and the colder and ſtormier that is, the larger and firmer are the Petrefactions. *Seventhly*, Add to this, that it is alſo Neceſſary to this Work, that the vegetating Life and Circulation of the Juices in the Plants be at a ſtand or paſt. For in *March* I obſerved that little or no Petrefactions had happened to theſe Vegetables, which had retained Life, and Circulation in their Veſſels, during Winter, as Graſs, *&c. Eighthly*, But ſince the Water, and Sediment, and Petrefactions all contain a Salt in them, it is hence plain that the Earth alone is not ſufficient to form thoſe Petrefactions. *Ninthly*, This Salt being chiefly Nitre always, it ſeems that this is the fitteſt Salt for forming thoſe attractive Bodies, and preferable to the other mineral Salts. *Tenthly*, Since all the Grounds about the dropping Well, and the Sludge in *Band* or *Bind* Well, abound with Sulphur, and the Petrefactions loſe ſo much by burning in the Fire, theſe indicate to us the Neceſſity and Preſence of a third Principle, *viz.* Sulphur. Since theſe Waters differ little or nothing in Weight, (allowing for their fixt Parts) from common Water we have no Reaſon to ſuſpect their great Impregnation with a mineral Spirit beyond other ſpring Water.

From which Inferences we draw the following practical Uſes. *Firſt*, Since theſe Waters contain ſo much ſmall earthy Parts, they would therefore be very improper for Bathing, for thoſe Parts might by Degrees get into and block up the Pores, and ſo produce abundance of Miſchief to the Body by leſſening or hindering Perſpiration. *Secondly*, As theſe Waters like a Solution or ſtrong Infuſion of Japan Earth, or Bole, coagulate Milk and Soap, (which cannot be from their little Salt) this Earth ſeems of a rough aſtringent Nature. *Thirdly*, Since this Earth forms no Petrefactions whilſt in a briſk Motion, or in a temperate Seaſon, or on Vegetables whilſt they preſerve their vegetating Life, the Fear of their leaving Petrefactions in living animal Bodies is very ridiculous, and grounded upon neither Reaſon nor Experience, but a wild extravagant chimerical Opinion. Tho' I own an unreaſonable long Courſe, and unconſcionable Quantities of thoſe Waters daily drunk, may ſo expand the Flood Gates of the Kidneys and Ureters, as to leave ſome ſmall Sand or Gravel ſticking to the Sides of the leſſer or larger Pelvis, as of the Reins after a long Uſe of them; hence Sand and Gravel voided by and with the Urine; but this is the drinkers Fault only, and not that of the Waters. Suppoſe one ſhould drink five or ſix Quarts of this Water daily for a Month (as was the Cuſtom formerly in drinking mineral Waters) then he ſwallows about a Pound of this Earth, which being carried into the Body muſt be allowed a Vent ſomewhere, whereby Sand muſt be diſcharged. *Fourthly*, Since theſe Waters contain ſuch an alcaline, aſtringent rough Earth in ſo very ſmall imperceptible and impalpable Particles, it is certain no better Medicine in the World can be contrived by humane Invention for Hemorrhages or Fluxes of any Part of the Body, or Colliquations, or Diſſolutions of the animal Juices of any Kind. For if theſe Diſorders are from an acrid Salt diſſolving the due and healthy Texture of the Blood and Juices, here is a very noble and efficacious alcaline to abſorb the Salts and ſweeten the Fluids, which will more than anſwer the Intent of the teſtaceous Powders. Or if the Sharpneſs and Saltneſs of the Blood and Lymph, has ſhorn off and waſted ſome Part of the inſides of the Blood Veſſels, here is a fine ſmall Earth to ſheath up the Salts, and compenſate the Ravage made upon the Solids and Veſſels themſelves, or where the Veſſels are tender weak and thin, the ſecretory Ducts or Strainers widened, and pour off the Fluids in too great Quantity, here is an aſtringent earthy Matter, which binds up and ſtrengthens the weak or dilated Parts. The Sulphur in the Water is at the ſame time drying, the Nitre cooling and gently ſtimulating, till it is changed by the Powers of the animal Oeconomy. *Fifthly*, Hence theſe Waters are of the greateſt Uſe when the animal Secretions are too much encreaſed, ſeeing they cool and thicken the Juices, ſuppreſs too great a Fulneſs, ſtrengthen and brace up the Veſſels and Strainers. Therefore they cannot fail to be ſerviceable in all unnatural Diſcharges of Blood, whether by Spitting, Stool or Urine; or by exceſſive menſtrual or Hemorrhoidal Fluxes in the *Fluor Albus*, Diabetes, profuſe Sweatings, violent Fluxes of the Belly, whether Diarrhea, Dyſentery, or Lienteria, where the natural Springs are not quite worn out, and the Body paſt all help. In Ulcers of the Viſcera, hectic Fever, Atrophy and pining away of the Body, either inſenſibly without Pain or Sickneſs; or by profuſe colliquating night Sweats, or wherever thickening, healing, ſtrengthening, ſweetning, cooling and cleanſing are indicated, I cannot conceive a more profitable and pleaſant Method left in Phyſick to recover the Patient (if curable by any Means.) *Fifthly*, But then they are not to be gulped and ſwallow'd down in unmerciful Quantities, nor without any Preparation; the Uſe of theſe Waters is always to be preceded with Rhubarb once or oftener taken to cleanſe off the Groſs Excrements in the firſt Viſcera, that the Contents of the Element may anſwer ſooner. Three half Pints of the dropping Well is a ſufficient forenoon Doſe, and five half Pints of the *Band* Well. Their Uſe forbids all violent Exerciſe, together with any Kind of Diureticks or Purgatives which carry off the Water before it has done its Errand in the Body; and of all the Diſtempers I have named, the *Fluor Albus*, night Sweats and Aſtrophy will only allow of moderate Exerciſe. All Hemorrhages forbidding Exerciſe, except in ſome particular Circumſtances which are only to be judged of by the Phyſician preſent. A Courſe of theſe Waters forbids the Uſe of Ale, Drams, Punch, white Wine, and made Wines, and very little if any red Port. A little red Port alone or with this Water may be allowed to thoſe accuſtomed to Wine or ſpiritous Liquours; if any Succeſs is expected from the Waters, a ſtrict Regard is to be had to the Diet. Milk, Eggs, Gellies of all Sorts, Barley, Almonds, Rice, Panadoes, Chickens, and Chicken Broth, Kid, Veal, Lamb, are allowable. Of Fruits, Quinces or their Marmalade, Auſtere Apples or Pears roaſted, Morella Cherries, Service Berries, &c. with other aſtringent, thickening, cooling Foods.

But all heating, ſharp, ſalt ſtimulating Things muſt be laid aſide, as Pepper, Muſtard, Ginger, Onions, Raddiſhes, Shalots, Chives, *&c.* or Meats, wherein they are, whether fryed or baked. Cheerfulneſs, agreeable Converſation, Diverſions that require not much bodily Exerciſe, are good and conduce to the Succeſs of the Waters; Day Sleeps, and Night Air, are hurtful. *Sixthly*, But as theſe Waters are highly conducive and reſtorative of the Health of ſuch as labour under the above Diſeaſes, they are no leſs miſchievous in thoſe Diſtempers which ariſe from too great a Thickneſs of the Blood, Diminution of Secretions and Obſtructions; hence they are not to be meddled with in Jaundice, Dropſy, ſuppreſs'd diminiſhed or irregular *Menſes*, Hyppo, Melancholy, ſtuffings of the Veſſels of the Lungs, Obſtructions of any of the Viſcera, Coſtiveneſs, Stoppages of the Lacteals and Miſentery, Lymphatic or glandular Swellings, Kings Evil, Schirrus, Hardneſs of the Spleen, or in any Caſe where thinning, relaxing, opening, deterging, Attenuation, Inciſion, or Stimulation are required. Let it however be remembered, for the Benefit of the Sick, that tho' the Earth in thoſe noted petrefying Waters be all *Lapis Calcarius*, yet there is great Difference as to its Fineneſs and Coarſeneſs, according to the Grain of the Stone through which it is ſtrained, and all of it taken into the Body is of the Nature and anſwers the Deſign of the *Oſteocolla* Stone in binding and ſtrengthening, as well as of the teſtaceous Powders in abſorbing and ſweetning, and are all drying, yet they anſwer different Intentions according to the Smallneſs or Groſsneſs, Smoothneſs and Roughneſs of their Parts. For ſuch as carry in them a Coarſe Earth, as the dropping Well, are moſt effectual in curing Looſeneſs, Diabetes, or bloody Urine. But ſuch as contain a very fine impalpable petreſying Earth, carry their Effects further as to the Lungs, for ſpitting of Blood or Catarrhs, or into the whole Habit, as Hecticks, Atrophies, colliquative Sweats, *&c.*

PART II.

PART II.

Of the Purging Chalybeate-Waters.

THESE are *Scarborough*, *Malton*, *Aſwarby*, and *Stenſied*, to which we add, *Orſton*, *Retford*, *Walcote*, *Semperingham*, &c.

As *Scarborough* Spaw is of great Fame and Antiquity, and hath engaged many Pens in warm Controverſies about it, I think myſelf obliged to begin my Obſervations here. The Name of the Place is *Saxon*, ſignifying a Burgh or Borough on a ſteep Rock; it ſends out two Members of Parliament, is governed by two Bayliffs, two Coroners, four Chamberlains, and thirty ſix Burgeſſes, conſiſting of three Benches annually choſen. As to the Caſtle and its Government, you have the full Hiſtory in *Vol.* 6. *Pag.* 39, *&c.* of the *Magna Britannia*. But ſtill a more particular and juſt Account was ſent us from an unknown Hand, which being very exact, pleaſe to take it in the following Words.

" The Situation of this Place is very romantic, it bends in the Form " of a Creſcent to the main Ocean, of which you have an unbounded Proſpect from all parts of the Town. The Town is built upon " the Declivity, and almoſt at the Foot of a lofty Hill, on the top " whereof ſtands a well fortified Caſtle, that hides its Head among the " Clouds. This Caſtle from the Advantage of its Situation, has been " the moſt impregnable Fortreſs in the Kingdom. The Town is walled " and moted round, except where it joins to this Caſtle, or unboſoms " to the Sea. The Caſtle is of a vaſt extent, towering upon a lofty " Promontory to the Eaſt that runs far into the Sea. It overlooks two " Stone Piers, that form a Harbour, which though very Capacious, and " one of the moſt Commodious in the Kingdom, is yet ſcarce able to receive the Ships belonging to the Place. There is an uncommon Reſemblance between this and the Bay of *Naples*, but the Cliffs upon " which this Caſtle ſtands are of an amazing Height, ſo very high, that " it ſerves for a Seamark to the Ships which ſail from the Northern " Seas, and is generally the firſt Land they diſcover. And tho' the " Caſtle is built upon the Summit of ſo ſteep a Declivity, yet within the

"Walls you find a Plain of eighteen Acres of Ground, yielding a rich "and fertile Paſturage, with a conſtant Supply of freſh Water, ſo that "both Nature and Art combine to render the Place tenable againſt every "thing but civil Rage. This Fortreſs being of great Antiquity (for it "was firſt built by *William Le Groſs*, Earl of *Albemane* and *Holderneſs*, and fallen into Ruines and Decay again, was rebuilt and made a "Fort by King *Henry* II. about 1134.) It is curious to obſerve the "Openings contrived for the Shooting of Arrows againſt the Aſſailants; "the Places for Grates and other Conveyances, through which to throw "ſcalding Water and other ponderous and offenſive Matters upon them, "with the Draw-bridges, the Watch-towers, Battlements, and other "Devices of Fortification. The Buildings here are numerous, uniform, neat, regular, large and commodious; it is not eaſy to furniſh out "a more magnificent Scene, or to gratify the Imagination with a more "pleaſing Proſpect than what we here receive from the Immenſity of "the Ocean. The ſight of that vaſt Expanſe or Abyſs of Waters, "which often appears loaded with ſuch a Number of Ships, that it "ſeems to groan under the Burden. The Tide looks as if the Waters "were expanded and preſſed wider by the floating Caſtles upon it, they "appear to the Eye of the diſtant Beholder, like a Foreſt of ſtately "Oaks, or lofty Cedars, as if it were to familiarize the Wonder of "moving Woods. The Receſs of the Sea leaves a beautiful Parterre, or "ſpacious Area upon the Sands for two Miles, the whole as level as a "Bowling-green, and at ſuch times, all ſorts of ſprightly Exerciſes "and genteel Diverſions go forward there. The Town is Peninſular, "and almoſt environed with the Ocean; if you turn from the Sea, your "Proſpect is every where bounded with high Hills. The adjacent Country affords a beautiful variety of verdant Meadows, fruitful Plains, "and pleaſant Groves. But towards the Sea, ſurely the Face of Nature no where makes ſo Groteſque a Figure; it is here the Scene becomes agreeably diverſified, it is here you find unexpected Contraſt, "here you find Meads among Rocks, and Rocks among Meads, gloomy "Caverns, and riſing Towers. The refreſhing Gales from the Sea, "with the Shade offered by the Mountains, give a moſt agreeable Temperature to the Air, during the ſultry Summer Heats. The frequent "Breezes entirely diſſipate and diſpel thoſe noxious Vapours which often happen where the Air is ſtagnant, and produce ſuch a Serenity, as is not to be paralleled in the more inland Parts of this Climate."

The Spaw Iſſues from the Bottom of a large Cliff, about a quarter of a Mile South of the Town, from which is a ſteep Deſcent, and then along the Sands till you come to the Spring, whoſe Water, freſh taken up, is extreamly clear and tranſparent, has a very quick and pungent Taſte, and leaves a pleaſant Flavour upon the Palate. The ingenious Dr. *Robert Witty*, then of *Hull*, was the firſt that favoured the World with the Diſcovery, Nature, and Uſes of this *Spaw*. [a] He lived cotemporary and in great Friendſhip with Dr. *James Primroſe* Phyſician there, and

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[a] *Scaroborough* Spaw, or a Deſcription of the Nature and Virtues of the Spaw at *Scarborough* 1660, *May* 29. Our Author having deſcribed the Scituation, Signification, Rarities, and Government of the Town, comes to the Spaw, which he ſays was diſcovered about 1620, by one Mrs. *Farrow*, a Charitable and Phyſically diſpoſed Gentlewoman of good Repute, who lived in the Town, and ſometimes walking that way, obſerved the Stones in the Water-courſe of a Ruſſet Tincture, and finding the Water have an acid Taſte, different from common Spring Water, and obſerving that Galls gave it a purple Colour, ſhe imagined it had ſome medicinal Qualities, and both drank of it herſelf, and adviſed her Neighbours to it, and found it opened the Belly, ſtrengthened the Body, and cured ſome Diſtempers. Thus it firſt became the common Phyſick of the Inhabitants, then it quickly gained Reputation in the Neighbourhood; in few Years its Fame reacht *Hull*, after that our Author went yearly to *Hull*, and carefully informed himſelf of the Nature and Effects of the Water on its Drinkers, often recommended it to his Patients in ſundry Caſes. Then the Citizens of *York* and Gentry both of this and ſeveral other Counties, being apprized of its Worth, reſorted to it; and ſeveral of thoſe who had drunk the *Italian*, *French*, and *German* Spaws, preferred this to them all, for its quick and eaſy Paſſage by Stool and Urine. Then after his own Tryals and Obſervations for twenty Years, he communicates them in his firſt Treatiſe, which he from time to time enrich'd with freſh and more digeſted Materials at each Edition.

This Water, he ſays, partakes of Iron, Vitriol, Alum, Nitre, and Sea-Salt; it is very clear and tranſparent, ſomewhat enclining to a Sky Colour, has a pleaſant acid Taſte and inky Smell, a Pint of it put to a Pint of boiling Milk crudled it preſently, and made a very clear and pleaſant Poſſet-drink. Galls turn it inſtantly to a claret Colour, or like Syrup of Violets mixt with Water, with a few Drops of Spirit of Vitriol. After the Gall has been ſome Hours in it, it turns it ſo black and dark that one cannot ſee the Bottom of the Veſſel, but if you take up the Veſſel ſoftly, and ſet it down again with a Knock on the Table, ſo as to break the minute Parts of the Water, a blackiſh Sediment ſoft to the Touch falls to the Bottom, and the Water becomes clear again, and may be ſeparated; ſome Quarts of this Spaw Water leave not above two or three Spoonfuls of this Sediment, which evaporated, leaves a blackiſh ſharp Powder, which he takes to be Iron, or Iron vitriolated. And this he often uſed in Medicine with ſurer and better Succeſs, than any preparation of Steel in the Shops, being more aperient, eſpecially when Vitriol was added to it. Every five Quarts of this Water contain an Ounce of the above five Minerals. But in a dry Summer, he found the Proportion greater, whether they were extracted by Diſtillation or Exhalation. When the Water was gone, the Powder laid at the Bottom, like parched Meal, ſomewhat bitter, ſalt, ſharp, ſtyptick, and of an aſh Colour, but eaſily ſeparable from the Skillet. But in his firſt Edition he could only obtain three Drams of Sediment from three Quarts of Water. He filtred other three and the great Antagoniſt of the Immortal Dr. *Harvey* who diſcovered the Circulation of the Blood. After Dr. *Wittie* had continued at *Hull* eighteen Years, he removed to *York* about 1656. from whence he favoured

three Quarts and boiled a while, then diſcovered a reddiſh Sand at Bottom (the ſame with that which falls to the Bottom when the Water is tinctured with Galls) he took the Skillet off the Fire, poured the Water into another Veſſel, the Sand remaining he found was a Dram, ſoft and not ſharp, which he thinks is Rubric, or vitriol of Iron, it was of a ſtiptic, not ſalt Taſte. The *Mater Ferri* thus ſeparated, he ſet the Water on the Fire again, ſcummed it carefully, and at the Bottom was two Drams of a whitiſh Sediment, bitter and ſharp to the Taſte, when the Water was almoſt evaporated, it roſe up in *Bulla's*, making a bubbling Noiſe, like the boiling of the Alum-works at *Whitby*, from which, and the firm Attachment of its Sediment to the Skillet, he will have it to partake much of Alum. When he had laid thoſe extracted Minerals ſome time in a cold and moiſt Place, the ſalts cryſtalized and appeared like Iſicles, which is the Form of Nitre, and this next to Alum, he takes to be the predominant Mineral in thoſe Waters, then Vitriol, then Iron, and laſtly Salt. Nor can he imagine how theſe Minerals could be better ſeparated, or more clearly demonſtrated.

But he has alſo other Reaſons beſides theſe, which induce him to think that theſe are the Minerals wherewith theſe Waters are impregnated, as, 1. For Nitre, at the Bottom of the Rock from which the Water riſes, there is much Nitre, which diſcovers itſelf in Veins all along, but eſpecially within eight Yards of the Well, where in hot dry Weather it ſweats out, and is white as Snow. 2. For Iron, there are many Stones of Rubrick, beſides much of the Earth that falls, being waſht down by the Sea, turns to Iron-ſtone, hard as Iron itſelf, and fuſible in a Smith's Forge, which he tried. Within a hundred Yards of the Spaw, is a Piece of a Cliff converted into Iron-ſtone within a few Years. 3. In the Cliff and Rock thereabout, is abundance of Alum-ſtone. 4. The deep Tincture wherewith Galls ſtrike this Water, beyond any other he has known or read of, ſhews it to partake plentifully of Vitriol, which unites itſelf with all the Minerals inſeparably, for whatſoever way you extract them, the Acidity is very predominant, and he alledges that the Waters plentiful Imbition of the eſurine Spirit and Salt of Vitriol, makes it more largely corrode the Tincture of the other Minerals through which it paſſes. 5. He thinks it borrows the Salt from the Sea, wherewith the Spring is ſometimes overflowed, for he finds no Marks of foſſile Salt thereabout. He denies not but there may be ſome other leſs diſcoverable Minerals in thoſe Waters, but he contents himſelf with the moſt conſpicuous, and leaves the reſt to more curious and trifling Examiners.

This is the Caſe at the Fountain, but when it is carried to ſome Diſtance, there is a loſs of Minerals, according to the Length it is removed, eſpecially if taken in Oak Barrels, at whoſe Bottoms ſubſides a yellowiſh Sediment, not unlike *Crocus Martis*, of a ſtiptic Nature, ſuppoſed to be the Chalybeate part of the Water, ſeparated by the Veſſel and Agitation of the Liquor in Carriage. Sir *John Anderſon* of *Braughton* in *Lincolnſhire* firſt obſerved this; and at his Houſe, which is only forty Miles diſtant, it would not curdle Milk as at *Scarborough*, nor did Galls give it ſuch a deep Tincture, nor had it ſo grateful an Acidity. Which he ſuppoſes is from the loſs of its vitrioline Parts, which being more ſubtle than the reſt, are evaporated. This Well he ſays ſends out about twenty four Gallons of Water in an Hour. From Section favoured the World with the firſt Edition of his Treatiſe on *Scarborough* Spaw in 1660, *May* 29, the Day of the Reſtoration, this was ſoon followed by ſeveral others before the Year 1678, when he enlarged it,

Firſt, He is upon Water in general and particular, the Origine of Springs, the Cauſe of Rain, Hail, Snow, Dew, Flux and Reflux of the Sea, and the Reaſon of its Saltneſs.

Section the Twelfth, He reaſſumes his Thread of Diſcourſe on Mineral Waters, whereof *Agricola* reckons up ſix ſimple Sorts, *viz.* Salt, Nitrous, Aluminous, Atramentarious, Sulphureous, Bituminous, and *Scarborough* Spaw, which is a Mixture partaking of ſeveral of them.——— The manner how Waters imbibe the Virtues of Minerals is, 1. By receiving its Vapour, thus Water let ſtand in a Braſs, Copper or Iron Skillet ſome time, taſtes of the Metal. 2. By ſome of its Juices being diſſolved in the Water while the Mineral is yet in Embryo. 3. By Corroſion of the Subſtance of the Minerals, whoſe embryonated concrete Juices are diſſolvable in Water, eſpecially where there is Vitriol. 4. By Confuſion, changing the Subſtance of the Mineral into Water, this is done more quickly if the Waters have imbibed a vitrioline Juice.

The Production of Mineral Juices, ſome have imagined to be created perfect at firſt, ſeeing we have no manifeſt Seeds of them, as of Animals and Vegetables, neither are their Subſtances fluxible, but firm and permanent, yet ſubject to decay in time, therefore muſt they be repaired and preſerved by Generation, for as the Seminaries, and not the perfect Plants of Vegetables were created at firſt, ſo Minerals were only in Embryo at firſt, becauſe Moiſture is as neceſſary for the Production of the laſt as of the firſt, therefore all Philoſophers are agreed that Minerals and Metals are generated; and Experience proves that Mines of Salt Petre, Alum, Tin, Lead, Iron, &c. when they are wrought out, will in a certain Number of Years repullulate and generate their Minerals again.

Scarborough Spaw is impregnated with its Minerals all the above four ways, according to the Nature and Capacity of each Mineral. It receives the Vapour of Vitriol and Iron, yet ſo as it hath ſomething of the concrete Juices of both. It has its azure Colour from the concrete Juices of Vitriol, Iron, and Alum. It is plain it has Iron, for being either boiled or put in Oak Veſſels for ſome time, there appears a reddiſh Sand inclining to yellow, which is only *Mater Ferri*, or Rubric, and this is diſcoverable by putting a little Powder of Gall to it. Laſtly, Nitre, Salt and Alum, being diſſolvable in Water, are mixed with it, as I have proved.

Next comes he to treat of his five Minerals diſcovered in thoſe Waters, *viz.* Vitriol, Alum, Iron, Nitre, and Sea-Salt, and gives their Differences and Uſes. He ſays there are three Sorts of Vitriol, *viz.* Roman or Copperas, Cyprian or Blue, and a kind of Blackiſh found in *Liguria*. Vitriol is hot, biting, and of an aduſt Quality, and yet ſtiptic and adſtrictive, and therefore dries up Humidities; it is uſed in Diſeaſes of the Eyes, and all moiſt Diſtempers; ſtays Bleeding, provokes Vomiting, kills and expels all ſorts of Worms, but mixt with Water, all its Qualities are more moderate. Iron is dry in the third Degree, it is alſo ſtiptic, ſomewhat like Vitriol, good againſt all moiſt Diſeaſes, eſpecially of the Belly and Uterus, ſtrengthens the Seminal Veſſels, opens Obſtructions of the Liver and Spleen, diſcuſſes their Swellings, ſtrengthens a weak and relaxed Stomach, is good in Dropſies; Iron and Braſs joyned are more Purging and Opening, hence moſt of the vitriolic Waters in *England* looſen the Belly. Of Alum *Galen* reckons up three Sorts, and ſays they are all of groſs Parts and very ſtiptic, abſterſive, healing, and ſomething corroſive, it hinders the Generation of Ulcers, ſtays it, and put it forth in *Latin*, having diligently attended the Place for moſt of thirty-ſix Summers, laid in a Stock of valuable Obſervations on

ſtays Female Fluxes, is uſed in drying Medicines, *&c.* Our Spaw proceeds from a nitrous Mineral within the Earth, elſe how ſhould it enlarge ſo great a Quantity as a Dram of Nitre, to three Quarts of Water only. He ſays Nitre is of two Sorts, natural and Artificial. *Serapio* ſays, the firſt is reddiſh, *Galen* ſays he has alſo ſeen a white Sort, but all agree that Nitre is drying, digeſtive, abſterſive, and reſolving, cutting groſs and clammy Humours very ſtrongly; its Taſte is between Salt and Sowre, inclining to Bitter, it corrects the Sharpneſs of Urine and Ulceration of the Bladder from Cantharides, and cures the Poiſon of Muſhromes. Salt is either Rock Salt, or Marine, the firſt is more groſs, earthy and compact than the laſt; yet both are deterſive, cleanſing, reſolving, purging, drying, kills Worms, preſerves from Putrefaction, *&c.* The Minerals in this Water are not yet arrived at their ſtate of Perfection, nor never will, but remain in an imperfect ſtate in the Waters, yet ſo as in many things they agree with, and ought to be preferred to thoſe already in Perfection, tho' they do not exactly correſpond in every thing. Hence they have their Taſte, Colour and Smell from Vitriol, yet excite they not Vomiting, except from a Weakneſs of the Stomach, or the Drinkers Indiſcretion in pouring down too large Quantities. But from the Iron and Vitriol the Water is grateful to the Stomach, ſtrengthens its Tone, and raiſes the Appetite. From the Nitre it reſolves, abſterges, cuts groſs Humours, is proper in Nephritic Pains, cleanſes Kidneys, Ureters, and Bladder, from Stone, Sand, and ſabulous Matter. It is the Nitre that Cryſtalizes. From theſe three, and Salt, it has its purgative Quality, and that without either Pain or Gripings. The Allum added to theſe, makes it Stiptic and Aſtringent; hence he has known it cure Superpurgations, and is ſucceſsfully uſed in ſeveral Female Diſorders from ſuperfluity of Humours; and indeed after fifty Years ſedulous Obſervations, and the repeated Experience of a thouſand Drinkers, it is certain that this Water may ſafely be drunk by all Ages and Sexes, by Women either with Child or not with Child, and in Diſeaſes of the greateſt Difficulty, which have reſiſted the moſt judicious and experienced Practiſe; nor can *Europe* produce a more pleaſant Spring, or one that will anſwer a greater Variety of Intentions, let them be never ſo famed. Tho' he would not be here ſuppoſed to recommend it to every individual without any difference of Safety, Preparation, Doſes, or Regimen.

He next aſks the Queſtion, and reſolves it in the Affirmative, *viz.* Since five Quarts of this Water, containing one Ounce of the Mineral Salt, beſides Spirits, and the uſual Doſe to the Drinkers is three or four Quarts every Morning, whether it be ſafe for the Drinker, to have ſuch a Portion of them paſs every Day through his Body? And tho' it be ſo ſafe and innocent, that none in *Europe* does better ſuit general Indications, yet it cannot be expected to cure all Diſeaſes, nor is it ſafe for every individual Perſon to drink ſuch Quantities of it, without previous Preparation, and ſuitable Diet with it; for want of which, to ſave Charges, he has known ſeveral miſcarry, and blame the Water for their own Fault. As ſome worn out by chronic Diſtempers, and a long Journey, have died before they have drunk two Quarts of Water in a Week. Others coming with full ſcorbutic Habits of Body, have without any Preparation or Advice, ſwilled down prodigious Quantities, and fallen into Gout, or other arthritick Pains. Others who never had the Stone, tho' Hereditary to their Family, coming there, have fallen into a ſevere fit of the Gravel. Others liable to a on the Nature, Variation, and Effects of the Water, in what Caſes and what Conſtitutions they had, and were moſt likely to be ſerviceable, hurtful,

Diarhrea, drink it to ſuch Exceſs, as occaſions a Super-purgation, and died for want of good Advice, and the Water killed them be ſure. Another Query is, Whether might not the mineral Salts extracted from the Water, anſwer all the Intentions of the Water, whether given alone or in the Water, in as high a Degree, and eminent a Manner, as a Courſe of the Water it ſelf? To which he returns Anſwer in the Negative, 1. Becauſe he has found upon ſeveral Tryals, that theſe mineral Salts are indiſſolvible in Water. 2. Becauſe it is the Nature of Salts to heat, dry, and aſtringe, and this Nature they had not before. 3. Becauſe the Water in Evaporation loſes its volatile and ſpirituous Parts. 4. Becauſe it would be an endleſs Toil to extract ſo much genuine Salt. 5. Becauſe there may be ſome Qualities in the Mixture of thoſe Principles which we may ſuppoſe loſt in torturing them, or they may acquire a Nature very different from what they had.

This Spaw has this in common with other Water, that it cools and moiſtens the Body, quenches Thirſt, but being impregnated with the above Minerals, it is hot and dry in Operation, therefore corrects cold and moiſt Bodies, and cures Diſeaſes ariſing from an Exceſs of theſe. Tho' this Water be actually cold and moiſt, but potentially warm and dry, yet theſe its contrary Qualities being ſo moderate, that we are not to expect a forcible Operation from any of them, therefore fitter and ſtronger Means may be uſed to any of thoſe Intentions. This Water is of thin penetrating deobſtruent Parts, it attenuates, incides, diſſolves, deterges and evacuates both by Stool and Urine, yet ſo plentifully both ways, as tho' all the Humours went but one way, without any Pain or Gripes. He one Morning drunk three Quarts of the Water *facta prius Retrogradatione*, then weighed himſelf before he drunk the Water, that he might better judge what Alteration it made on his Weight. He drunk a Pint every half Hour, and kept walking about; when he had drunk three Pints, it began to work both ways; within eight Hours he had ſeven Stools, within five Hours he made a Quart of Urine within half a Gill, clear and without ſmell or taſte, he evaporated the Urine, but nothing remained, except a filthy mucous Sediment of a ſandy Colour. This is a ſpeedier Evacuation than is done both ways, by any Mineral Water in *Europe*. Next Morning he weighed himſelf again and had loſt two Pound and a half, but was more nimble and briſk than before, whereby he thinks it ſtrengthens the Body, and yet unloads it from the remoteſt Parts, but every one muſt ſee the inſufficiency of this Experiment.

Section 13. He enumerates about thirty remarkable Cures which he had obſerved in ſundry Diſeaſes, from the Uſe of this Water, and recommends its Uſe in nineteen more either from Obſervation or Reaſon, but Hiſtories of Obſervations, moſtly taken at Random, without the true Hiſtory of each Diſeaſe, its Cauſes, Nature, and Effects, and no Account what things had been helpful, hurtful or indifferent, whether given accidentally or deſignedly; nor have we the clear Symptoms of the Illneſſes pointed out to us, whether particular or common, in their due Order and Degree, nor what happened to the Patients by things ingeſted, egeſted, retained, or excreted, *&c.* I therefore paſs over theſe Hiſtories, and content myſelf with a bare naming of the Diſeaſes wherein he had ſeen it ſerviceable in forty Years Experience and Obſervation; tho' I own we have no Hiſtories of that time to exceed his.——In a ſcorbutic Habit with Pain in the Joynts, and ſhortneſs of Breath, ſucceeded by the Gout. In the ſame Habit with a Bleeding at the Noſe, or with a Heat of the Bowels, Shortneſs of hurtful, or indifferent to, then maturely reviewed and examined the whole, and publiſhed it as a general and laſting Legacy, both to his Country-

of Breath, and Pain in the Knees. The Water is good in ſeveral Diſeaſes of the Head from Diſorders of the Stomach and lower Belly, in Convulſions either from bilious Humours in the Bowels, or Worms. In ſcorbutic Palſies, Megrim, Vertigo, cold Sweats, intermitting Pulſe, and univerſal Weakneſs after a Fit of the Palſy. In Convulſions and Dimneſs of Sight from a Palſy. In the Epilepſy from hot Vapours darted from the Hypocondria into the Head like Flaſhes of Lightening. But remember this, that if the Palſy, Epilepſy, Vertigo, or other Diſeaſes of the Head be Idiopathic, or originally in the Head, or ſuppoſe they are from Sympathy, theſe Waters are improper and not to be depended on in the beginning or State of the Diſeaſe, while the Animal Spirits are dull, and the Humours fixt, but Recourſe muſt be had to more forcible Remedies, till the Diſeaſe comes to its Declination, then the Waters, along with Medicines ſuited to the Caſe are of ſpecial Uſe to perfect a Cure, if the Patient will be regular. It is alſo good in Aſthmas and ſtuffing of the Lungs, provided they are not ulcerated, nor the Body too cold, feeble and aged. It is ſerviceable in Rheums and Catarrhs, in the Gout, Inappetency, Indigeſtion, Vomiting, Belching, Heartburn, Surfeits, inveterate griping Pains in the Stomach, or fixt acute Pains with Diſtention, Induration, and a bending of the Ribs. In the Jaundice and Vomiting ſucceeding a tertian Ague, cauſed, by firſt, the ſmall Pox, then a ſevere Fever, and with Child all that Time, which muſt be owned to be a difficult Caſe. In inveterate Obſtructions of the Myſentry, Liver and Spleen, tending to a Dropſy, or even in a begun Schirrouſneſs of the Parts; but if the Dropſy or Schirr be inveterate, the Waters muſt either be refrained totally, or their Uſe preceded by proper Medicines. In Scurvy and Cachexy joyned, if drunk at the Fountain; for if the Water is carried and kept, it weakens the Stomach and turns the Body yellow. In obſtinate intermitting Fevers, if drunk in the Abſence of the Fit, or it is ſerviceable to purge off the Dreggs of ſmall Pox, and Agues. It has ſurprizing Succeſs in Hyppo and Hyſtericks. It kills all Sorts of Worms and expels their Neſts. In Inflammations and Ulcerations of the Kidneys; in the Stone, Gravel, Dyſury, Strangury, *&c.* except there is a large confirmed Stone in the Kidneys or Bladder. It is ſingular in carrying off the Remains of a Gonnorrhæa, and the Dregs of Mercurial Courſes, or to cure bloody Urine; and alſo in many uterine Diſeaſes, as Hyſtericks, *Clorofis Fluor albus, aut Menſes nimii.* It cures Barrenneſs, prevents Abortion, it is good for Children of five or ſix Years old, ſtrong old People, or Women with Child in their middle Months, if ſome Indication forbid not.

Section 14. Contains the Rules previous to, during, and after a Courſe of thoſe Waters; ſuch as are in Health, and need no Preparation before, let them only take heed they drink not too much before the Water begins to work, which will be in four Hours Time; and even to them it may be of Service to remove beginning or latent Obſtructions, and in expelling Humours, which by lying in the Body might be the Seeds of Diſeaſes. But the ſickly muſt not forget to have the beſt Advice, their Bodies muſt be prepared according to the Nature of the Diſtemper whether ſimple or compound, the Age and Conſtitution of the Patient, the Parts affected, and Stage of the Diſeaſes; and to know whether the Water is ſuitable to his Caſe, and will anſwer his Expectation: But a Set of Particular Rules can only be given by the Phyſician on the Spot, for ſome muſt firſt have a Courſe of Apperients and Purges when the Obſtructions are rebellious, Humours tenacious and Nature dull; for the Water has been ſingularly uſeful in the above mentioned Caſes, yet it was not

Countrymen and Strangers for future Ages; but from this very Caſe, we ſee neither Ingenuity, Diligence nor Humanity, can ſcreen and preſerve

not uſed alone, but had the Preparations and other concomitant Aſſiſtants of other Medicines. Sometimes in full Bodies and hot Diſtempers, bleeding is good. They muſt begin gradually, and drink two half Pint Glaſſes of it about ſix a Clock in the Morning, and either ride or walk half an Hour till that is ſomewhat gone off the Stomach; then drink another Pint and walk about, till they have drunk four or five Pints for the firſt Morning, except the Body is weak (then leſs will ſuffice) leſt it cool the Stomach too much and cauſe vomiting. If the Water has cleared its Way the firſt Day, he may venture on three or four Pints more next Day, and between every two Draughts, let him chew ſome Stomachic or Carminative, or ſwallow their Powders to warm the Stomach. They muſt be ſure that they have drunk their full Doſe by nine or ten of the Clock at fartheſt, that it may work off before Dinner, which they may know from the Urine turning of a higher Colour; ſuch as cannot walk to the Spaw, may drink it in their Room, or if they pleaſe, air it a little before the Fire. Their Diet here muſt be ſparing; Salt Meats and Variety of Sea Fiſh muſt be avoided, and ſuch as eat of the laſt, ſhould drink a Glaſs or two of Sack or Claret after it. Salads are alſo very improper here, breeding theſe very Diſeaſes which they expect the Water ſhould cure. He thinks it not adviſeable to drink the Water in the Afternoon, becauſe it keeps the Body too open, hurries the Meat too ſoon out of the Stomach, may diſturb the Patients night reſt, occaſion Gout or ſome other Arthritick Pains. He diſcharges Afternoon Sleeps, but adviſes to Riding, Bowls, or ſome other Exerciſe. If the Waters ſwell the Body and go not off, a Purge may be given, or a purging Glyſter injected. The Time they are to drink theſe Waters muſt be ſuited to the Obſtinacy of the Diſeaſe, and the Patient's Strength; for Melancholick, groſs and full Bodies, require longer Time than thin Bodies, which are readily moved. But in obſtinate Caſes, rather than continue too long at a time, it is better at a Months End to leave off the Water, and return to their ordinary Diet and State of Life, and then apply himſelf to the Water again; and when one Courſe would not do, he has often obſerved this Method effectual. But if a Man once finds Relief from the Waters, and then begins to decline in his Health, his Appetite fails, the Water goes not off as before, but his Belly and blood Veſſels ſwell, he is Aſthmatic, or has a Pain in his Head, it is full Time for him to deſiſt for that Seaſon, and take to Exerciſe, and that failing to apply to a Phyſician. The fitteſt Seaſon for drinking is from the firſt of *May*, to *September*. For during the Summer, the Water is ſtronger of the Minerals, great Rains weaken it much; indeed in a hard and ſtrong Froſt, the Waters are as ſtrongly ſaturated with the Minerals; but except in Caſes of Neceſſity the Coldneſs of the Seaſon favours not their Uſe. 2. The Paſſages of our Bodies are more open and paſſable in Summer than in Winter, ſo that the Water goes better off. 3. Our Bodies being dryer in Summer, we may drink more plentifully, Roads are better, Days longer, and travelling pleaſanter. Here he Anſwers the Objection againſt Purging in the Dog Days, ſaying it is not forbidden from the Influence of the Star, but the uſual Heat of the Sun at that Time; beſides Aſtrologers agree that there are many other Conſtellations of greater Malignity to human Bodies than the Dogſtar, as *Scorpio*, *Caput Meduſæ*, the Dragons Tail, *&c.* neither is our Climate ſo hot as theirs at *Coos*, now called *Sango*, near *Rhodes*. Such as are neceſſitated to drink it in Winter, muſt warm it, walk about in a cloſe Room, ſerve us from the Envy and Hatred of the Malevolent; for this kind and generous Undertaking, and Performance, ſtirred up very warm, but weak and unequal Adverſaries againſt him, which drew him into a long Controverſy in the Declination of Life. The firſt attack he had was from *William Simpſon* Batchelor of Arts, [a] who ſet up to practiſe

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Room, well aired with a good Fire. This Water loſes much of its Virtue both by carrying and long keeping, comes ſhort of its Taſte, Purity and Operation, tho' it will purge, yea probably after it is become fetid, but then it ſpoils the Stomach. He never heard of one remarkable Cure done by it at a Diſtance, therefore adviſes all that want it to repair to the Spring. Thus we have a ſhort but full Abridgement of what concerns the Spaw in this Book.

[a] *Hydrologia Chimica*, or Chimical Anatomy of the *Scarborough*, and other Spaws in *Yorkſhire*, with Animadverſions on Dr. *Witties Scarborough* Spaw, and a Deſcription of *Malton* and *Knaveſburgh* Spaws, *&c. London* printed for *Richard Chiſwell*, 1669. By *William Simpſon*, *Philo-Chimico-Medicus.*

Allowing the five Principles which Dr. *Wittie* will have in this Spaw, and from which it receives its Virtue, yet he has left us in the Dark, whether his firſt, *viz.* Vitriol, be that of Iron and Copper; for if the firſt, then is one of his Principles ſuperfluous, the Iron being the metalline Part of the Vitriol, which is the eſurine Salt diſſolved in the ſubterranean Veins of a Spring. If it is the Vitriol of Copper, then muſt the Operation of the Water be emetick, for the Body of the Copper being diſſolved, becomes deſperately vomitive, and can ſcarcely be ſeparated from the eſurine Salt which has ſeated itſelf thereon; or if it were the laſt, the Iron would by their mutual Embraces be tinged, and almoſt changed into Copper. Again, If the eſurine Salt diſſolved in the Water meet with a Vein of Copper in the Earth, it frets and diſſolves it, and at the ſame Time that Acidity is coagulated upon the Metaline diſſolved Parts, and both come together in the Water, in an indiſſolvable Nexure, when the eſurine Acidity is terminated, and can act no more, tho' it ſhould meet with Iron, having loſt its fretting Power. Again, Iron cannot be diſſolved and appear in the Form of a Liquor, without a diſſolvent or Menſtruum; thus we reject both Vitriol and Iron from any Part of the *Compoſitum* of this Water. And as to the ſundry Kinds of Vitriol we allow that of Iron, Copper and white Vitriol, the ſecond admits of great Variety; but it is merry to think that the Dr. will have Colcothar to be a third Kind of natural Vitriol, and that it turns Iron into Braſs or Copper, there being no ſuch natural Metal as Braſs, nor its Vitriol. And as to the Ways whereby Water imbibes the Virtues of Minerals, we reject all his, and ſubſtitute in their Room only that by Odour; for ripe Minerals ſend forth no Vapours, no not by Decoction, Diſſolution or Confuſion, therefore again we diſmiſs Iron and Vitriol out of this Water. An ingenious Friend of ours, a chimical Apothecary in *York*, put ſome of the Sediment in Spaw, given him by Dr. *Witty*, in a Crucible, and ſet it in a ſtrong calcining Fire for three Hours, without the leaſt Alteration or Appearance of Colcothar, Vitriol, or Crocus of Iron; it ſtill remained fixt, but was whiter; then he took it out, diſſolved it in Water, filtered and evaporated it, and had a pure white clean Salt, with a little inſipid aſh-coloured Earth left in the *Caput Mortuum*. And as to the Quality of the five ſimple Minerals, which the Dr. will have to impregnate this Water, we cannot allow Vitriol for a ſimple Mineral Salt, but it is compounded of thoſe Ingredients which

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practiſe Phyſick firſt in *York* in Oppoſition to Dr. *Wittie*, whom he uſed very unlike a Gentleman, but miſſing of his Deſign there, he removed

muſt neceſſarily go to its natural Geneſis, therefore we cannot tell its Virtues before it is anatomized and each part known; nor can we admit Iron to be drying and ſtiptick, but it precipitates the *Tartarum reſolutum*, or *Sal excrementitium*, which had faſtned it ſelf in the Bowels of the Spleen and Liver, *&c.* Allum is another of the Doctor's Ingredients, but he allowing ſeveral Sorts of it, and not telling us which of the three impregnates this Water, has left us as much in the Dark as ever; only he ſeems to mean the Dyers fictitious Alum, made of Alum-ſtone, Urine, Salt, and Kelp. Nitre is the fourth thing in this Compoſition, but tho' He allow two Sorts of it, yet has he not told us which of the two this is, but inſtead of both gives us the Virtues of artificial Salt-petre. His laſt Ingredient is Salt, which, if there, would be diſcoverable from its brackiſh Taſte; but that being not perceptible, we conclude it an imaginary Principle as well as the other four; and therefore diſmiſſing all five, we go to the Spaw itſelf, with a Solution of the Doctor's five Principles ready prepared, and give him a publick Challenge to make an artificial Spaw Water, with all five. He refuſes to accept of ſo unfair a Challenge, alledging that his Minerals were natural, but ours were altered, having paſſed the Fire; we ſay they are only bare Solutions of the Mineral Ingredients, made without any ſtreſs of Fire, and very fit for Experiments; he however declined trying: I called for a Porringer of the Water, and put ſome Drops of Solution of Iron in it, which made it taſte like *Knareſburgh* ſweet Spaw; a Solution of Nitre and Salt altered not its Taſte, and a Solution of Mineral Alum put to them, brought it not near the Taſte of the Spaw, nor did an addition of Vitriol amend it. A Solution of Galls put to the Mixture, made it quickly thick and muddy like Ink, becauſe of the Alum and Vitriol, but Spirit of Vitriol cleared it again. We alſo put a little clear Solution of Powder of Alum into one Porringer, and Spaw Water in another, an Infuſion of Galls put into each, turned both of a deep Purple Colour; a little more Infuſion of Galls added, they became black and dark almoſt like Ink, whence it is evident that purple and dark Colours are producible from other Liquors than Vitriol and Iron, as the Doctor imagines. Spirit of Vitriol cleared both theſe Mixtures. Hence we conclude there is a great Similitude between Solution of Alum and Spaw Water; but to thoſe Solutions, cleared with Spirit of Vitriol, we put ſome Oil of Tartar, which made them almoſt as black as Ink, but cleared them again with more Spirit of Vitriol; Salt of Hartſhorn turned both confuſed and muddy again, ſo that the Spaw Water and Solution of calcined Alumſtone, admitted the like Precipitations, and the Solutions by Acids and Alcalies. Then we took freſh Spaw Water, and a Solution of calcined Alumſtone, and poured Oil of Tartar into both, which cauſed a whitiſh curdling Precipitation, both were cleared alike ſoon by Spirit of Vitriol. Now let us Philoſophize upon theſe Precipitations and Diſſolutions; and here a Friend of ours informs us, that upon a Quantity of Spaw Water, he poured ſome *Lixivium* of Tartar, which cauſed a great curdling Separation of a whitiſh Matter, which after ſome time ſtanding fell to the Bottom, the Water poured off, and this dried to a Powder, it was a white and inſipid Calx; by which it is plain that the Salts of the Spaw and *Lixivium* were diſſolved together in the reſtagnant Water, and let fall to the Bottom only the *aluminous Powder*, which the Acidity of the Water had diſſolved in itſelf, and that without the leaſt Perception of either Vitriol, Iron, or moved from thence to *Wakefield*, and ſome Time after, from that to *Leeds*, where he ſpent the reſt of his Days, and publiſhed ſeveral Things.

any other Ingredient. From theſe Experiments we would prove againſt the Dr. that this Spaw conſiſts only of a common Water impregnated with an aluminous Salt, which from a mineral Acidity had diſſolved only a ſlight Touch of the Mineral of Iron, and therefore reject the Nitre, Salt, and Vitriol. The Loſs of its Mineral Spirits, upon Carriage in Oak Veſſels to diſtant Places, is not from Evaporation of Vitriol or vitrioline Spirit, but from a Quaſſation of Parts, which in wooden Veſſels admitted of incipient Putrefaction, whence an Inverſion of Parts and Alteration of the Texture of the Water, and a Precipitation of Parts from the Oaken Veſſels. Then we offer to prove from ſundry Arguments, that there is no Vitriol in the Spaw, chiefly becauſe it is not emetic, even to him who for a Fortnight together drunk eighteen Quarts a Day. We deny alſo that there is Nitre in it, for 1. Tho' the clear Water be poured off from its Sediment with the Galls, and ſet on the Fire till there is a Separation of a whitiſh crudling Matter, then take it off the Fire, let it ſtand to cool, and there will be a whiter Precipitation than before, from which pour off the Water, and the Precipitation taſtes like Nitre; yet after the Precipitation by the Galls, the decanted clear Water receiving an Alteration by the Fire, began to make a ſpontaneous Separation of part of its Contents, which we look upon to be of the ſame Nature of the Sediment which remained after boiling up the reſt of the Water. The Doctor apprehended Taſte conſiſted only in the Flavour of his imaginary Principle, for many Solutions on the Fire give a Separation of Parts, which are but of the ſame Parts with the Reſiduum after Evaporation. 2. Tho' there is Nitre found upon the Cliff or the Rock where the Water ſprings up, yet it is generated by the Air, and is only to be found ſuperficially, as in old Walls, therefore called *Nitrum murarium*. 3. Tho' by expoſing the Sediment or Minerals in a cold moiſt Air, there have been Cryſtals like thoſe of Salt Nitre, yet the aluminous Body being of the ſame Nature with the Alum in the Cliff, its Particles attract one another, and gather the Nitre floating in the Air, which ſettles upon proper magnetical Bodies. The Doctor will have Vitriol in the Water, 1. Becauſe it loſes its Spirit by Carriage, which he therefore will have *Vitriolic*. He alſo imagined that the Water would loſe its tincturing Property with Galls, tho' hermetically ſealed up; this we tried once, and when it began to putrefy we broke the Bottle, and the Water tinctured with Galls; the ſame we tried a ſecond time, but it did not do. We let a Bottle of it ſtand open, and it loſt its tincturing Power in two or three Days; therefore it is plain from the firſt Experiment, that there is no loſs of any volatile Parts, therefore not of Vitriol, but only an *Apporrhea mineralis*. If it had a Spirit, he ſhould have ſet to the Diſtilling the Water to have catched it, but his Tools were very mean, *viz.* a Skillet and culinary Fire. I told him if there was Vitriol there, it would Vomit; he ſaid he often gave Spirit of Vitriol in his Cordials, but it never vomited; I replied, becauſe it was ſtript of its colcothar, but had he given both together it had certainly vomited. As to Nitre he was ſure it was there, for put ſome Galls into the Water, let it ſtand till it precipitate, pour off the Clear from the Sediment, ſet it upon the Fire, and there will be a Separation of a whitiſh crudling Matter; take it off the Fire, let it ſtand to cool, and it will let fall a whiter Precipitation than the firſt; this taſtes like Nitre, the reſt of the Water boiled away, affords the reſt of the Minerals. But I ſay, that after the Precipi-

Things. He aſſumes the Title of chimical Phyſician, or a lover of chimical Phyſick; but he was too young and raw a Scholar to attack

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tation by Galls, the clear Water receiving an Alteration from the Fire, began to make a ſpontaneous Separation of part of its Contents of the very ſame Nature of that which remained after Exhalation; and as to its Taſte it was only becauſe he would have it to be ſo. 2. The Doctor will have it to be Nitre, becauſe of the plentiful Exudation of this Salt from the Cliff; but I ſay this is only ſuperficial, generated from the Air, and therefore affects not the Water. And as to the Streſs he lays upon his cryſtalized Iſicles in the Sediment, this will not do, for the aluminous Body in the Water, is of the ſame Nature with that on the Cliff; for by the Sediments ſtanding it attracts the floating Nitre in the Air. The yellow Earth which lies here in Veins, infuſed in Water and filtred, the Liquor turned Purple with Galls, white and precipitated with Oil of Tartar and Spirits of Hartſhorn, but Spirit of Vitriol cleared them both again. Some of this Infuſion diſtilled in a Glaſs Retort, left a bright ſtiriated Floſcule, which by a greater Fire became a white dry Salt, of a Styptick aluminous taſte; the Water which came off changed not with Galls or Oil of Tartar. This proves a parity of Parts between this mineral Earth, and Spaw Water, which is nothing elſe but this eſurine acid Salt in its mineral Earth, being an aluminous terreſtrial Glebe diſſolved in the Water. The ſpecifical Difference of all mineral Salts depends upon, 1. A ſulphurous Acid eſurine Spirit. 2. A mineral Glebe, from the various Solutions and Mixtures, of which ariſe the variety of Salts in the Bowels of the Earth. Water impregnated with the acid ſulphurous Spirit, ſcattered through the narrow Crannies of the Earth, according to the Mineral which falls in its way, becomes coagulated into ſuch or ſuch a Salt, for if it meets with a ſalſuginous Glebe, it becomes coagulated according to the Property of the Glebe, together with its connate Salt into a Salmarine, which is by the Water diſſolved and carried into the Sea; hence it is brackiſh, and has its Mineral from foſſile Salts, which alſo ſaturate ſome Spirits as *Knareſburgh* Sulphur Water. If this acid ſulphurous Water meets with nitrous Veins, it coagulates into Nitre, which diſſolved and carried away in the Current, ſeems to be the Origine of intenſely cold Springs, as St. *Magnus* Well, *&c.* which tho' exceeding Cold, yet by their ſulphurous warming Property, do notably open the Pores of the Bathers, and reſolve the congealed Blood and Latex, ſettled about the Joints and outward parts of the Body, and are the cauſe of Pains, Stiffneſs, *&c.* If this acid Water finds *Strata* of Iron, it is either the Origine of vitriolic or acid Spaws, as *Knareſburghs* Sweet Spaw, *Tunbridge*, *Epſom*; the firſt has but little Mineral, a ſlight touch of Iron, and its eſurine Spirit is very remiſs: Hence its drinkers muſt ſwallow great Quantities before it operates. The Mineral of Copper coagulates this eſurine Salt into a cupreous Vitriol, and either hords it up in Mines, or diſſolves it into Water Springs. Or laſtly, this Acidity is coagulated into Mineral cupreous Stones, reſolvable by much Rain, which boiled and filtred, ſhoots into common Vitriol. But if this acid Water find an aluminous Glebe or Rock, it is thereby coagulated into natural Alum, as in *Scarborough*. The variety of Mineral Earths proceeds from their innate Seeds, ſhut up in themſelves, which Seeds divine Power has diſperſed in hidden Places in the dark Body of the Earth, whence variety of mineral Glebes, which beginning to ſhape Bodies for their ideal Eſſences, by forming to themſelves a mercurial volatile Juice, and an embryonate tack ſo reputed, ſage, and learned a Phyſician, not having taken his Bachelors Degrees above ſix Years and a half, during which time, he

onate Sulphur, which two Principles the mineral archial Faber operates, ripens the elemental Crudities, and in proceſs puts on a Tincture and Weight, and at laſt terminates in the coagulation of a perfect Metal, ſpecificated according to its Seeds.

Having laid aſide ſo many of Dr. *Witties* Ingredients in this Water, and reduced them only to two, this is not done to depretiate the Water, for in the eſurine Salt of Alum, are as noble medicinal Virtues to be found, as in any other mineral ſpecificated Salt whatever, this Salt being volatile in its *primum Ens*, and there exquiſitely penetrative, forcing its way through Obſtructions, notably reſerrating them, reſtoring the Blood and nervous Juice to their Vigour; to explain which, we conſider, 1. The Natural fermental Digeſtion of the Body. 2. The Depravations thereof. 3. The Diſeaſes thence enſuing. 4. The Reſtoration of theſe Digeſtions, by removing the Obſtructions of the Blood and Humours. But this we ſhall deliver almoſt word by word in the Helmontian Doctrine of Fermentation and Acidity. With this the Waters are improper, and either avail nothing, or are hurtful in the following Diſeaſes from Helmont, *viz.* Peſtilence, Pleuriſy, Prunella, Poiſon, Leproſy, Pox, Morphew, Cancer, Epilepſy, Apoplexy, Palſy, but if the laſt four Diſeaſes happen from Obſtruction of Female Evacuation, drinking the Waters may break through theſe Obſtructions, and clear the way, but then they are not conſidered as natural Diſtempers. To theſe he adds Fevers, and almoſt Catarrhs, Flatulency. But it is highly ſerviceable in Scurvy, Dropſy, Stone, Strangury, Hippo, Jaundice, Cachexy, obſtructed Menſes and Diſeaſes therefrom ariſing, immoderate Vomiting, Heartburn, and Pain and Acidity of the Stomach. The Cauſes we aſſign for theſe Diſeaſes, we have borrowed from the ancient Egyptian Hieroglyphicks, as the incoercible Flatus, culinary Digeſtion, *Eveſtrum vitæ*, Peroledi, Archeus, Gas, Blas, Deulock, *&c.* which we diſcourſe of as diſtinct intelligent Beings in the human Body. Theſe are things beyond the Ken of the preſent Age.---The Cauſe of all hot Springs is from mineral Salts acting upon one another, or on mineral Bodies, and for this we are obliged to the Obſervation of a noble Lord near the City of *Bath*, which was publiſhed in the *Philoſophical Tranſactions.* Laſt of all, we come to the Eſſence of this Spaw, three Gallons, and three Pints, whereof he took up and let ſettle ſome time. Its firſt Precipitation was a reddiſh Sediment, from which he filtred the Water, dried the other in the Sun, and found it a red Earth, or kind of Ocre, ſuch as falls to the bottom of all Channels of mineral Springs; then we put the Water in great Glaſſes placed on a Sand Furnace, with a gentle Heat. In a Day's time roſe to the Surface of the Warer a Film which we took off with a Silver Spoon, and dried in the Sun; it proved a light, ſcaly, white Floſcule. Some more of the ſame ſeparated after ſome time, ſome of it fell to the Bottom, the reſt ſwam a Top, from which we filtred the whole Water, and dried it in the Sun, it was the ſame as before. Then we exhaled the Water in Glaſſes, and the Sediment was of an alumino-nitrous Taſte, but chiefly nitrous, and would give again in the Air; this we diſſolved in Rain-Water, and filtred, it left an inſipid, gritty, ſparkling Powder. The filtred Water (which with Oil of Tartar gave a milky Separation, as tho' juſt taken up at the Spring, but Galls tinctured it not Purple) being again exhaled, what remained was diſſolved, filtred and evaporated, the ſame was done a third time, each Filtration left a ſeparation in the Cape. We took two Quarts of the foreſaid he had chiefly applied himſelf to the Study of Chimiſtry, in reading *Helmont*, *Paracelſus*, *Zwelfer*, *Seudivogius*, &c. which will very ſoon elate a young unexperienced Practitioner, and tend to make him litigious and prolix, as was really the Caſe of the Phyſician we are ſpeaking of, who, in this Performance, accumulated a great many foreign Subjects, relating neither to mineral Waters nor their Uſe, as that on the conſtitutive Principles of all concrete Bodies, that on the univerſal Character ſcraped up from his Acquaintance and Converſation with the ingenious Dr. *Wilkins* of *Rippon*, his Ternary of Medicines, &c. As to what concerned Dr. *Wittie*, he was not long indebted to him,

ſaid Water, which having filtred, we put in a Skillet, and boiled away two thirds, then let it cool ; and a Sediment of inſipid fell to the Bottom. The Water was filtred and exhaled, a pretty white Salt remained, which was diſſolved in Rain-water, filtred, and the Calx being dried in the Sun, was a bright ſparkling Powder, the filtred Water exhaled by a gentle heat till it was almoſt dry, then he filtred it again, &c. Thus we could at Pleaſure ſeparate from the limpid Spaw, as it ſprings up, eleven or twelve diſtinguiſhable ſorts of Earths, different in Colour, Figure, and Conſiſtence, which this alumno-nitrous Salt in the Water razeth off from ſeveral Rocks or Quarries of Stone which it paſſeth through ; all theſe Sabulums were dried in the Sun, therefore not with different Degrees of Heat to alter their Colour, none of them were calcined, or ſuffered the ſtreſs of Fire, they were all inſipid, for the Salt was concentred in little room. From theſe ſabulous Concretions, the Miſchief (when it happens) accrues to the Drinker, for want of fit Medicines to carry off the feculent Dreggs, which precipitate upon the Bowels, Sides, and Orifices of the Veſſels, obſtructing the wonted Fluidity of the Blood. Hence in ſome Bodies, Fevers, Dropſies, Defluxions of Rheum, Stone, *Tormina Ventris*, Swellings of the Legs, or elſewhere, &c. Theſe ſabulous Concretions are from ſeveral Stones, Sand, or Earth, their Parts ſeem to be very diſſimilar, ſome gritty and hard, ſome ſoft and impalpable, ſome bright and glittering like Venice-Glaſs ; others more dull, even the laſt ſeparated of theſe Concretions, were ſo far from ſubtle and impalpable Powder, that they conſiſted of larger ſized Particles, bright and ſparkling like Filings of Silver. As to the eſurine Salt, which is the Eſſence of the Spaw; it is a kind of alumino-nitrous Salt, which if rightly managed projects into Cryſtals or long Stiriæ, and brancheth itſelf forth into curious Shapes ; it is almoſt of a nitrous Taſte, and caſt upon hot Coals or a Spatula, neither flames nor melts, flows neither in a Crucible nor ſtrong Fire. Therefore where we ſaid that Nitre is not in it, we deſire to be underſtood of the common inflammable Nitre. The Proportion of this Salt to the whole Water is as 1 to an 128. A little of this Salt, which is the real Eſſence of *Scarborough*, taken in a Glaſs of Rheniſh Wine, purges gently by Stool, and is as effectual in all Diſeaſes where the Water is proper, and may even be given with Advantage in Fevers, and to cure Sterility. Thus we have all that relates to our Purpoſe in this Author. I have omitted here his ſeveral Subjects foreign to this Deſign, as that on the univerſal Character, his Diſcourſe on the conſtitutive Principles of all concrete Bodies, his Ternary of Medicines, his Railing againſt the *Galenic* Practices, long and unintelligible Cauſes of Diſeaſes, &c.

before he returned an Anſwer [c], tho' he had at this Time ſeveral other Avocations, as the Attendance on his Practice, his ſedulous Application

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[c] *Pyrologia Mimica*, p. 127, *primo*----- In his Preface he complains of *Simpſon*'s rude, illiterate, paſſionate, and uncivil Treatment of him, the Reaſons whereof were, 1. His full and ſtrong Intention, if poſſible, to leſſen the Doctor's Character, and upon the Ruins thereof to eſtabliſh his own. 2. To overturn the rational Practice of Phyſick at *York*, and eſtabliſh the chimical Method, and make way for the Sale of his own Ternary of Medicines. The Doctor not unapprized of the Deſign, and the Miſchief that muſt thence enſue, oppoſed himſelf to it, vindicates the Union of *Galenical* and Chimical Practice, defends the eſtabliſhed Diſpenſatories till better offer, for this he was obliged to intermit his Studies, to attend the publick Coffee-Houſes, thoſe Places of Rendevouz of *Simpſon* and his Party, till he ſucceeded. 3. He condemned the Doctor's Practice, depreciated his Judgement, and had decoyed ſome of his Patients, and as a Screen or Cover for all, he Quarrels with the Doctor's Judgment about the Spaw, deſpiſes his Learning and Book, and to decorate his own, borrows Experiments from all the modern Chymiſts, and he like *Fauſtus* went about to conjure up *Mephiſtophilus*, or, as if the Chymical Spirits were like the infernal, will not be raiſed without hard big Words, and unintelligible Jargon, and tho' his Experiments are borrowed, he rarely owns the Theft. His Style is peculiar, his Inferences are upon miſtaken Grounds, he draws general Concluſions from particular Premiſes, his Philoſophy is entirely new and precarious, his Candor and Ingenuity leſs, Defamation is his Maſterpiece. As to Phyſick, he has had the Misfortune either to read bad Authors, or ſet out wrong, beginning where he ſhould leave off, is an inconſiſtent Author, tho' Practice gave no Interruption to his Studies. And being a perfect Stranger to the Spaw, yet from Hypotheſis he can tell what Diſeaſes it will Cure; then he proceeds to a long Detail of the Cauſes of Diſeaſes from *Van Helmont*, and wretchedly miſtakes his Author into the Bargain. He is obliged to the Doctor's Quotation for his Account of the Origin of hot Springs; and tho' he derives the Origine of all perennial Springs from the Sea, yet he overlooks four of the Doctors ſtrongeſt Arguments for them from Rain, Snow and Dew. He is not only out of Humour with the Doctor, but with theſe grave learned Friends of his, who by ſome Verſes had Midwifed his Book into the World. Thus far from the long Preface, now to the Book.

Here the Doctor is very willing to ſtand a publick Tryal, he wonders that a Chimiſt ſhould only acknowledge three ſorts of Vitriol, when *Fallopius* aſſures us that every Metal has its own Vitriol, and the Doctor thought he had ſufficiently proved that this in the Spaw was that of Iron, not factitious Vitriol. And Water alone ſays he, but eſpecially aſſiſted with an eſurine Salt is capable to diſſolve Metals; no wonder then we find this in *Scarborough*, which has both Water, Nitre and Vitriol. And a Dram of Iron may be got out of a Quart of this Water, either when Galls are put in it, or when its carried far in Oak Veſſels or Bottles, and this Iron is of a ſtyptick Taſte, tinges the Mouth and Excrements black, and is preferable to *Crocus Martis*. The Doctor reliſhes not *Simpſon*'s Name of *Ens primum*, given to the eſurine Salt, 1. Becauſe this is the Name peculiar to the Deity. 2. Becauſe the Water itſelf is a ſufficient Menſtruum, but if that is too great a Favour to be granted, the eſurine Spirit of Vitriol, added to it will ſure do the buſineſs. 3. All the Current of learned Men who have wrote on Mineral Waters, mention no ſuch thing as *primum* *Ens*, tion to the *Latin* Edition of his *Scarborough* Spaw, &c. In ſome parts of this Work he is pretty ſharp, yet modeſt and moderate, conſidering the

Ens, all accounting the eſurine Spirit of Vitriol enough to make the Waters acid, ſo as to corrode the Minerals or Metals they meet with in their Paſſage. 4. It is a Miſtake, and contrary both to Reaſon and Experience, that when the eſurine Salt has diſſolved the Vitriol, they are thence capable to diſſolve no other Body in their way, for Salts of ſeveral kinds may be diſſolved in Water impregnated with one ſingle ſort, for Sea Water will diſſolve Nitre, after that Alum, and then Vitriol. 5. That the *primum Ens*, or eſurine Salt having diſſolved the Vitriol, is thenceforth incapable of touching any thing, is contradictory to himſelf, in *p*. 59. where he ſays it ſtill afterwards becomes determinated and ſpecificated according to the Difference of the Mineral Glebes it meets with, in this or that foſſile Salt or Mineral Mixture. And in *p*. 4. he ſays, if one of the Principles be made by this eſurine Acidity, Nature is not at leiſure to make another; this were ſuch an Indulgence as ſhe never granted herſelf. But in *p*. 45. thus far I aſſent, that an aluminous Salt from a Mineral Acidity had diſſolved a ſlight Touch of the Mineral of Iron, and both diſſolved in the current Spring of Water makes up the Spaw. *Page* 359. Upon a further Tryal of the Spaw Water, he found a Body of Vitriol which he calls *Terra Vitrioli*, and *p*. 360 and 364, he tells us he found Nitre in it, ſo here he finds Nature at leiſure to make two or three Principles more, which was all the Doctor wanted, and he had denied. Nay, *p*. 3. he aſſerted it was impoſſible for Iron and Vitriol both to be in the Spaw; but the beſt Authors agree, that ſeveral Springs in *Europe* imbibe two or three ſorts of Minerals in their Courſe. As to Iron, *Simpſon* cannot poſſibly find out what is in that Water to diſſolve. The Doctor ſays, Vitriol by its eſurine Salt, makes this Water corroſive, and ſo does Nitre and Alum, which will take in that or any other Mineral in their way; and *Paracelſus* ſays, that acid Waters are produced by the Reſolution of Metals before they come to Maturity, that is, while they are yet in their imperfect State or Embryoniſm, and yet he ſays, the Virtues of theſe Waters depend upon their impregnating Principles, thus the Doctor thinks his Principles of Iron and Vitriol ſtand ſure. And as to *Simpſon*'s ſorts of Vitriol, he gives them not from his own ſight, but from the Authority of learned Writers, as the Doctor himſelf does, who ſeems to underſtand them full as well as the other.

As to the Manner how mineral Waters imbibe the Virtues of Metals, Minerals, &c. That Waters receive it by Vapour, is evident from not only Copper and Braſs Veſſels giving warm Water a Taſte when it ſtood in them long, and Water ſtanding long in leaden Ciſterns cauſing a Dyſentery, and the firſt Water will kill Fiſh in a Night's Time. *Simpſon* ſays that Water will diſſolve Vitriol, but that it ſhould give it a Vapour, he underſtands not, and yet every drinker of *Scarborough* Water at the Spring, is ſenſible of its inky Smell. And *Fallopius* ſays, that vitrioline Waters are diſcernible by their Smell, as well as Taſte. But neither will *Simp*. allow the Vapour of Iron in thoſe Waters, becauſe it is a more ſolid compact Body, tho' it is not a ſolid Piece of Iron the Dr. contends for, but like an ordinary Earth to look on, when it is newly digged, or by the Surges of the Spring Tide in Storms, it falls from the Cliff, yet it is ſo ſtrongly impregnated with the concrete Juice of Iron, that in a ſhort Time by the Sun's Heat, it becomes Iron Stone; of which within ſix Score Paces of the Spaw, there is as much fallen from the Cliff, as will load four or five Carts, ſome of which he put into a Smith's Forge, where he ſaw it fuſible and melt in the Fire: This he ſhewed to ſeveral

the ſcurrilous Treatment he had received from a junior and inferior; and tho' it muſt be owned that the Doctor through his whole Writings ſhews himſelf a poor Naturaliſt, and no great Chimiſt, yet he Diſco-

ral Phyſicians who ſaw it Fact, beſides thouſands of Gentlemen, who have obſerved it, among whom was Mr. *Cotton*, overſeer of the Iron-Mines in the Edge of *Derbyſhire*, who was preſent with *Simpſon* at *Scarborough*, and affirmed it to be Iron, and that he would undertake to make ſolid Iron out of it. Now the Spring paſſing through this Earth, may be ſuppoſed to imbibe ſome of its mineral Eſſence. Do not counterfeit Coins very often ſmell of Braſs or Copper? does Steel in diet Drinks emit nothing? or wherefore is it put in? *Simpſon* will have Vitriol and Iron to be the ſame, tho' the beſt Authors join both in their Preſcriptions, and therefore ſuppoſe them to be different, for Steel is like good Metal without an Edge, and Vitriol like an Edge without Metal, but both joined make a Blade. And tho' *Simpſon* ſays they are near of Kin, yet that mends not the Matter, whilſt he denies the Exiſtence of both in our Waters. It is chiefly the Vitriol that gives them the Azure Colour, and this *Kircher* affirms, let the other laugh as loud as he pleaſes, nor is it any precarious Philoſophy. *Simpſon* wants to know how the Dr. imagined that there was Vitriol or Iron in this Spaw, ſeeing the Badges of Diſtinction claſh. That there is Vitriol in it he was ſatisfied, 1. From the eminent Acidity of thoſe Waters, which both *Fallopius* and *Paracelſus* give for a certain Sign of Vitriol. 2. From the Vitriolic or inky ſmell of the Water. 3. From Galls tincturing it Purple. 4. From the great Quantity of vitrioline Salt that ſweats out of the Cliff, of a dark yellow Colour, ſharp to the Taſte, beyond either Nitre or Alum. That there is Iron here is plain from 1. The Irony Precipitation from Galls or Carriage. 2. The blackiſh Colour it gives the Drinkers Excrements. 3. The great Quantity of Iron in the Cliff, out of which it ſprings. 4. The Efficacy of the Waters in ſuch Caſes, as indicate the Uſe of Chalybeates. The Doctor's ſecond Way whereby Waters imbibe the Virtues of Minerals, is when their Juices are diſſolved in the Waters, to which *Simpſon* makes no Objection; but comes directly to a vigorous Aſſault of his third, *viz.* by Corroſion of the Subſtance of the Minerals, and of this mind is *Galen*, *Helmont*, *Fallopius*, &c. for the Juice of Vitriol being of a corroſive Nature will fret and corrode Metals. But ſays *Simpſon* the *Ens primum* or eſurine Salt cannot diſſolve or imbibe any more Metals than one, but this was proved ridiculous before. 1 Becauſe a Water loaded with one Salt will nevertheleſs diſſolve others, *&c.* 2. Becauſe *Simpſon* himſelf had acknowledged Vitriol, Iron, Alum and Nitre in thoſe Waters. The Doctor's fourth Way of the Impregnation of Waters is by Confuſion with which *Simpſon* makes himſelf merry, tho' it is ſtill Plain that Vitriol, Nitre, and Salt, being diſſolved in Water, the Water and Salts are confuſedly joyned together, every Drop of the Water having ſome of the ſaline Particles mixt with it, and exiſting in every part of the Water; and this Term of Confuſion is often uſed by *Fallopius*, *Galen*, and *Kircher*. But tho' *Simpſon* is all this while contending againſt the Exiſtence of Vitriol in the Spaw, yet he finds *terra vitrioli* in it, and whence this Earth, where there was no Vitriol? and laſtly, that his chimical Apothecary could find no Vitriol in the Sediment of the Water, upon the ſtrongeſt Calcination: Does not Vitriol calcine white by both Heat of Fire and Sun? where then is the Strength of this invincible Argument? how can Vitriol being ſo much diluted in Water calcine into either a *Colcothar* or Crocus, ſo as to diſcover any other Colour than white? for upon their Diſſolution diſcovers a large Acquaintance with Authors, which he had read and well digeſted, and plainly appears to have been an excellent practical Phyſician, and a careful Obſerver of the Effects of thoſe Waters.

Simpſon

tion in Water, they muſt neceſſarily depoſite the Colour they had, and this *Paracelſus* on the ſame Subject has fully reſolved and determined, but had the Minerals been perfect in their kind, it might have been expected they ſhould have calcined to a red or purple Colour, but no ſuch thing can be expected when they are imperfect, and of this Opinion is *Fallopius* and *Zwelfer*. Had the black Sediment with the Galls been calcined, it would have given no ſmall light, for the black Tincture is received from the Vitriol, that in the Bottom is the Iron, which he calcined in a Crucible till it was hard as a Cinder, and of a dark brown Colour, being no other than the *Scoriæ* of Iron; this diſſolved a freſh in Water, Galls tinctured it not, ſo it was not Vitriol, tho' it was very brackiſh; this Water he exhaled again, and it left a ſharp biting browniſh Floſcule, which Colour it had neither from the Vitriol nor Galls, therefore from the Iron; when he calcined the whole Body of the Minerals as they came together from the Water exhaled, tho' they turned white, yet were there here and there Flakes of Iron interſperſed in the Powder, broad and thin like thoſe that fly off hot Iron under the Smith's Hammer, from all which it is plain here are both Iron and Vitriol. The Doctor ſent for ten Gallons of the ſweet Spaw from *Knareſborough*, filtred and exhaled it, the Sediment he put into a crucible and calcined, it was of the ſame Colour of the *Scarborough* Minerals, nor had it any Colcothar of Vitriol or Crocus of Iron nor Flakes like the other; the calcined Powder weighed a Drachm and a half, this he diſſolved in ſpring Water, and from it obtained only ſeventeen Grains of Salt, here we ſee three Pints of *Scarborough* Spaw contain more of the Mineral Juices than ten Gallons of *Knareſborough* Water. Hence the firſt is more operative than the laſt, and yet as pleaſant to the Palate, and as ſafe to be drunk. Now *Simpſon* grants that this Water has Vitriol and Iron, and yet it calcines white, and why may not the other which calcines white, as well have them, and tho' *Simp.* concludes the Section with diſcarding Vitriol and Iron out of the Spaw, yet after a little cool breathing he finds them there again in p. 39 44 and 359. The Doctor Defends his firſt Virtues of Iron and Vitriol from good Authority, and alſo his four firſt Galenic Qualities of hot, cold, dry and moiſt, and alſo what he had before aſſerted of Alum and Salt in the Spaw. Next he follows *Simp.* to *Scarborough*, where he ſays it proved lucky for him that he was there, or he had met with too warm a Reception; what he got by it, he appeals to the Gentlemen then preſent, who were alſo Witneſſes how he behaved himſelf on that Occaſion. As to Alum giving the ſame Tincture with Galls, tho' he tried but it anſwered not, the Doctor alſo infuſed the calcined Stone in Water, and Galls would not tincture this Water; he then tried the Alum-Stone of the Cliff and *Whitby*, but neither anſwered. In the Middle of the Alum-Stone Rock at *Whitby*, breaks forth a Spring of freſh Water twelve Fathoms below the Surface of the Alum Rock, Gall diſcolours not this Water, nor when exhaled does it leave any Sediment, which Mr. *Cotton* tried on the Iron-Stone Mine near *Barnſley*. The Doctor tried the ſame Water at *York*, without Succeſs, nor did Galls tinge an Infuſion of either calcined or uncalcined Iron-Stone in Water. It is not ſuppoſed that either Nitre or Salt do it, therefore it muſt be Vitriol. To the Query how the Doctor would demonſtrate theſe to be vitrioline Spirits which the Water loſt by carriage, he returns the former Anſwer; and to the Authority out of *Fallopius* he

adds

Simpſon being upbraided with Impudence want of Learning and Degrees, is herewith nettled, the firſt of theſe was natural, the ſecond in a ſhort time could not be helped, to remedy the third he poſts off to one

adds Doctor *Heers* in his *Spadacrene*, where he is proving the *German* Spaw to have imbibed Vitriol, becauſe, 1. Where ſuch Acid Waters are found, there is uſually ſeen ſomething of the Minera of Vitriol near at Hand. 2. From the notable Acidity that is in Vitriol, ſuitable to that which ſuch Waters have imbibed, he ſhews that the vitrioline Spirit of this Water is ſo volatile, that not only wooden Veſſels will not contain it, but even Glaſs Stills or hermetically ſealed Bottles. *Simpſon*'s Relation of their *Scarborough* diſcourſe concerning Nitre is miſrepreſented; for the Doctor anſwered, he knew that there was Nitre, becauſe it cryſtalizes into *Stiriæ*, when the Sediment was laid ſome Days in a cool Place. Here the Doctor heaps up ſeveral of his Contradictions, and aſſures us that that whole Proceſs laid down in the Epilogue at the End of his Book, he had from Doctor *Sam. Johnſton* of *Beverly*, tho' he had not the Honeſty to own it, juſt as he tells us that the Sulphur Well at *Knareſborough* is ſaturated with foſſile Salt, and in p. 143, that a marine Salt is the Cauſe of that ſulphureous Spring, and in p. 55, St. *Mungo*'s Well at *Cockgrave*, tho' it is extreamly cold to the Touch, yet by an intrinſick ſulphureous warming Quality, it opens the Pores, &c. And in the ſame p. He ſays, that *Knareſborough* ſweet Spaw, is but languid of Mineral Spirits, having only a ſlight touch of the Mineral of Iron, p. 59. The *primum Ens* will now diſſolve and take in as many Minerals and Salts as lies in its Way. *Simp.* thinks he Defames not the Spaw by calling it only an Aluminous Spring. But the Doctor deſires to be of another Opinion, conſidering how far ſhort Alum Waters are of this famous medicinal Spring, which has four other noble Ingredients in it; and this excellent Compoſition ſerving various Indications, muſt do more Cures than Alum alone; for the Virtues aſcribed to aluminous Waters by Naturaliſts, are far Short of thoſe of our Spaw. The profound *Kircher* ſays Alum Waters are aſtringent, and of an exceeding drying Quality, and the Places where they are, are commonly barren; hence they are found ſurprizingly ſucceſsful in the Cure of ſuch Diſeaſes as ariſe from too much cold and Moiſture; but tho' our Water is aſtringent and drying, yet it is alſo purgative, and our Ground is very fruitful. He ſays *Knareſborough* ſweet Spaw contains only Vitriol and Iron. And in his Maſter *Paracelſus*'s Judgment, Vitriol alone has greatly the Preheminence of Alum; therefore *Knareſborough* Spaw is better than ours, and how much more ſo ſtill when we allow him Iron into the Bargain. Where then is his, Let the Doctor know, and the World know, that in the eſurine Salt of Alum, as noble medicinal Virtues are to be found, as in any other mineral ſpecificated Salt whatever?

Fallopius and *Kircher* both think that chalybeate Springs are very ſcarce, for the firſt never ſaw one in his Life, but wiſhes they were more frequent, being exceedingly profitable in Diſeaſes of the Reins and Bladder, and the laſt adds, they have in them the Virtues of Iron and Steel, whereby they open Obſtructions of the Hypocondria, Hardneſs of the Liver, Spleen and thoſe Parts, are good in a beginning Dropſy, and ſtrengthen a relaxed and weak Stomach. Aud ours being a vitrioline Water, tho' not emetic, is thereby of a pungent penetrating Quality, attenuates and cuts groſs flegmatic Humours, is drying and leaves a moderate Aſtriction behind it, is therefore good in cold and moiſt Conſtitutions, and for expelling of Worms; But Nitre being moſt predominant in our Waters, according to *Kircher*, it is powerful in its Operation, one of the obſcure Univerſities in *Holland* or *France*, gets dubbed Doctor with a *ſub Camino* Degree in Phyſick, returns Home and makes a Reply to Doctor *Witty* [b] wherein he behaves himſelf a great deal better, more modeſtly, writes more intelligibly, and uſes leſs Bombaſt, the

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it corrects an ill Habit of Body, which the Pituitous are prone to; it looſens the Belly, is good in Diſeaſes of the Nerves, and for ſuch as are ſubject to Defluxions on the Lungs, heals the Itch and other cutaneous Diſeaſes, cures Noiſe in the Ears, and in a Word has a notable abſtergent Property. Now this Spaw containing all theſe muſt derive its Virtues from all. The Catalogue of Diſeaſes which *Simp.* will have this Spaw to cure, he takes Word for Word from *Helmont*, who indeed tho' he never knew of the Spaw, may be allowed as good a judge of it as our Antagoniſt, who pillaged alſo his five Digeſtions from the ſame Author, but ſome how loſt his ſixth by the Road. That the Alderman of *Hull*'s Caſe was an Aſthma (tho' *Simp.* will not allow it) Doctor *Primroſe* of *Hull* is Witneſs, who was equally concerned for him with the Doctor, for ſeveral Years with little Succeſs, till the Spaw relieved him in few Days, and he continued in perfect Health even till this Anſwer was wrote, which was fifteen Years after. We have almoſt daily Obſervations ſince of People cured of Aſthmas. *Simp.* is no better judge of another Gentlewomans Caſe, which he mentions, tho' he never ſaw her, ſhe had a very great Weakneſs, Dyſpnœa, and Hectic, even reduced to the loweſt, yet the Spaw cured her. His Deſcant upon the Cure of an obſtinate and deſperate Catarrh, which had reſiſted all other Methods, is as ridiculous. Then he diſcourſes on the Eſſence of Fevers, and like his Maſter *Paracelſus* exclaims bitterly againſt coolers, diluting or evacuating, and extolls his own fiery hot chimical Diaphoretic. He ſays the Green Sickneſs will not yield to the Spaw, becauſe it carries in it no Body of Minerals to anſwer, tho' five Quarts of it contain eight or ten Drams of Minerals.

Having thus followed the Doctor in every Step relating to the Spaw, let us take leave of him, and ſee what our Adverſary has to ſay for himſelf further.

[b] Hydrological Eſſays, or a Vindication of the Hydrologia Chimica, &c. together with an Anſwer to Doctor *Tonſtal*, &c. Printed by *J. D.* for *Richard Chiſwell* 1670, 8^{vo}.

Here he immediately cloſes with his Antagoniſt at downright Club-Law, with Arguments taken from the Doctor's own Authors, without making him a Leg. And 1. The Doctor aſſerts Vitriol and Iron two different Ingredients, or conſtitutive Principles of *Scarborough* Spaw; whereby he will have Vitriol a ſimple Salt, without any Dependence upon any mineral or metaline Body, and ſuch as has no Relation to Iron being quite a different thing, and yet afterwards he makes the one to partake of the other, calling them *ferrum vitriolatum*, or *Vitriolum ferrugineum*; but we prove that the Doctor can produce no natural Vitriol, from which, by Art, may not be ſeparated a mineral or metaline Body. Nay *Kircher* is very poſitive, that all Sorts of Vitriol conſiſt of an acid ſulphureous Salt or Spirit, in whoſe embraces are always one or other mineral or metaline Body couched, which is the main Pillar in the Conſtitution of the Concrete Vitriol, whether of Iron, Copper, or Silver; for if a lixiviate Liquor or volatile urinous Spirit be poured upon a Solution of any Vitriol, whether natural or artificial, it immediately precipitates the mineral Body contained in it; hence when chalybeate Waters are depauperated of their Vitriol, they give neither Colour, Smell nor Taſte of Vitriol by Galls

the Secretary of the Royal Society in one of their Monthly Papers *, * Numb. 52.
having given them a ſharp Reproof for their too great Heat and Peeviſhneſs;

Galls, *&c.* nor are they ſo medicinal to the Drinker.----Says the Doctor, this Vitriol is not ſo properly an eſurine Salt, as it has an eſurine Salt in itſelf. If ſo, then ſome other thing muſt go to make up the Compages of Vitriol, which muſt be an embrionated Mineral Sulphur, as of Iron or Copper; if Iron, then it makes the Vitrioline Spaws of *England* and *Germany*, and all theſe differ according to the Diſpoſition of the corroded Vein, or the different impregnation of the Preterlambent Water, with the eſurine ſulphureous Salt; if of Copper, then it makes the Vitriol of Copper. Yet all artificial Vitriols are made in imitation of Nature, as in thoſe that are made out of Copper, as by burning of Sulphur upon glowing or melted Copper; or that by cementation of Plates of Copper ſtratified with common Salt or Sulphur, *&c.* therefore natural Vitriol is *partus immaturus Sulphuris embrionati*, and has its metalick Body in itſelf.

Neither has the Doctor defined his Vitriol in the Spaw, only he ſays its an eſurine Salt, which acuates the Water, is able to corrode a Vein of Iron, and yet this Vitriol is not made out of the Iron. This ſeems to be inconſiſtent, except by Vitriol he mean a ſimple eſurine Salt, and this falls ſhort of expreſſing the true Eſſence of Vitriol, which is not Vitriol, but as it has a relation to a Mineral or Metaline Body. For *Helmont* ſays, That all the Seeds of Salts are placed in Water, yet are not endued with Taſte, except they find agreeable Principles of Bodies, not till then they diſcover their Saltneſs, and become determined into a ſaline Body, whether of Alum, Sal-marine, or Nitre; and that there is a Hermophradite general Salt of Metals ſuitable to all Metals, called an eſurine or acid Salt, and the beſt Vitriol is moſt naturally brought forth in thoſe Mines where Nature has laid up that eſurine Salt, corroding a ſtrong Vein of Copper.-----A palpable Powder ſubſides in the Water. It is true, either from Carriage in Oak Veſſels or Bottles, but eſpecially that which turns black by putting in Galls, and tinges the Drinkers Fæces black. Now this Powder the Doctor ſays is the Iron, and takes its Colour from the Vitriol, therefore the Vitriol muſt be left behind in the Water, and upon a new Addition of Galls, the clear ſhould give a freſh Colour, and yet it will not. So that this is the Minera of Iron ſeparated and precipitated in the Spaw Water; then neither Powder nor Tincture of Galls will induce a Change, which they muſt do were the Vitriol ſtill there; nay, diſſolved lixiviate Salt-peter put into it, inſtead of precipitating, gives only a turbid milky Colour, and in a little while after, the *Sabulous Concretions*, and Salts, will be joyned with the lixiviate Salt, and form a Tartar vitriolated; hence it is evident Iron and Vitriol are not two diſtinct Ingredients.--------The Doctor ſays the eſurine Spirit or Juice of Vitriol is enough to impregnate a Water with an Acidity, to make it corrode other Minerals or Metals by which it paſſeth, ſo that this eſurine Salt, or *primum Ens*, may be laid aſide as wholly precarious. The Doctor ſays, That the Spaw by its eſurine Salt more freely corrodes the Iron, and that Vitriol has an eſurine Salt in it ſelf, and yet he ſays it may be laid aſide as precarious, and preſently takes it up as moſt neceſſary, ſtrange inconſiſtencies! And for Anſwer to the firſt, Can the eſurine Spirit or Juice of Vitriol impregnate Water as a Menſtruum, and yet the ſame Spirit be wholly precarious? Reconcile this. The Doctor refers us to *Paracelſus*, but truly we are not ſo fond of him as he is, we admire not his Phyſiology, but his Medicinal Arcana's, by which he did great Cures, he tells us that Gold and

Lead are ſweet, but Iron and Copper afford Vitriol.----As to Waters imbibing the Nature or Virtue of a Mineral or Metal by Vapour, as by ſtanding ſome time in a Copper, Braſs or Iron Veſſel, till it taſte of it; this is pillaged out of Dr. *French* and *Fallopius*, the laſt tells us theſe Vapours are either Sulphureous or Bituminous; beſides theſe, he never found, read, nor will allow of any other benign ones; therefore he does not uſe it in the Doctor's Senſe, nor does he once mention the Vapours of Vitriol, Iron or Copper; nor can it be underſtood in his Senſe, that our Spaw partakes of Vitriol by its Vapour; and if there be a Vapour, it is from the Fermentation of Mineral Juices, which are not ſufficient to make up any one Mineral Body, ſo as to be the Cauſe of an acid Spaw.----And if the Iron being in Embrioniſm give it ſelf to the Water, yet it is only in its ſucculent Parts, and the Doctor explains an Agent capable of making the Iron ſpend itſelf; and if theſe parts of the Iron are corporeal (for incorporeal they cannot be) then the Vapours muſt have the eſſential parts of Iron in them, *viz.* Mercury and Sulphur. If ſo, what difference is there between the congregated Particles of Iron, and the Body of Iron itſelf? That Iron yields a Vapour in the Iron Works where it's melted, is from the Force of the Forge Fire, which ſets both perfect and imperfect Metals upon the Wing, and take up their Abode in the next adjacent places; the like does Lead, Tin, Copper, *&c.* but where are are theſe *Vulcan*'s Forges under *Scarborough* Spaw? As to diſcovering counterfeit Coin by Smell, it is true there is a continual winding off, or waſting of the parts of Bodies, ſome ſooner, others later, and to this all Bodies are more or leſs liable; but this is not the Caſe, for here is a ruſt of Copper, by the acid menſtrual Salt in the Air, and this Taſte or ſmell can only be aſcribed to the Vitriol, for either Copper or Braſs are very apt to gather a greeniſh Ruſt, which is its Vitriol, thus Carp put all Night in Water in a Copper brewing Veſſel, might die from the diſſolving of the Vitriol upon the ruſty Copper, or change of the Water, which might have ſome kind of Salt, and occaſion the Death of the Fiſh. We tried the Experiment by putting Fiſh in a clear clean brewing Braſs-Pan, and we preſerved them two Nights unhurt, but briſk and active.-----As to Steel-filings infuſed ſome days in clear Spring Water, the Water filtred and evaporated, and leaving a greeniſh Salt, but all Spring Waters contain their Mineral Salt and Earth; hence that variety of Taſtes eaſily diſcoverable by nice Palates. We alſo exhaled Water wherein Steel-filings had been infuſed, and the like Quantity of the ſame Water without Steel, and we had a like Quantity of the ſame Sort, and of the ſame Colour of Salt from each, but when we infuſed Filings of Steel in diſtill'd Water we had no Salt. As to the Apothecaries Boys laughing at Steel not emitting ſome of its Parts in a Diet Drink, let them burſt their Sides if they cannot recollect that if it is ſome groſs unprepared martial Body, ſome acid, as Lemons, is always added, or ſome Chalybeate prepared with Acids, as *Crocus Martis*; for it is required in all Chalybeate Extractions, that the Iron is reduced to a Crocus, either by Calcination, or by acid Spirits, or by affuſing ſomewhat that has an Acidity; for by all theſe there is a Solution of ſome of the Body of Iron in the Liquor, but ſurely none ever ordered a Chalybeate Liquor by purely pouring diſtill'd Water on the Filings of Steel. *Fallopius* ſays, Iron Waters are not to be found, for if this Metal gave itſelf immediately to Water, we ſhould find Iron Waters wherever this Mineral is waſhed with ſimple Element, now the Minera is looſe, and if that yield not, neither will the ſolid compact Body.------ As to Iron and Vitriol differing as a Knife and Ink, and all Authors treating of them ſeverally; we Anſwer they may be two diſtinct Bodies, but then the Vitriol muſt be ſuch as is made out of ſome other Metal or Mineral, but natural acid Salt and Iron, are coexiſtent in the ſame Concrete, are both one Body, and make what we call Vitriol; from which take the Iron, and what remains is no Vitriol, but only a common Salt more ſimple than Vitriol, and all Authors that treat of Iron and Vitriol as different Subjects, do it ſeverally, and not as they bear any relation to each other in mineral Solutions and Concretions, and herein they are right; but this is not the Doctor's Caſe or Senſe. And as to *Paracelſus*, his *Phyſiology* is not only to be neglected, but he is very heedleſs in his Aſſertions, for he calls that a Salt which is reduceable to a more ſimple Salt, as Vitriol, which is ſeparable out of Vitriol after the metalic Parts are ſeparated; or if the Doctor can ſeparate a Vitriol out of the Spaw, after the Precipitation of the Minera of Iron, he ſhall be owned Victor. If it is true that the main part of the Vitriol in the Spaw is Spirits, then we ſhould doubtleſs catch it by Diſtillation; for if this Vitirol is Spirit very ſubtle, volatile, and penetrating, then theſe Spirits ſhould firſt come over the Helm, yet this we tried once and again in a well luted Glaſs Retort and Receiver at the Spring Head, but without Succeſs. But ſuppoſe we had obtained a Spirit, which by the Sharpneſs of its Taſte, and Sulphureouſneſs of its Smell, had demonſtrated itſelf Vitriolic, yet would it not have followed that theſe had been Vitriol, it being impoſſible to make Vitriol out of theſe Spirits alone, which may indeed be coagulated into a ſolid dry Salt, but this as far from the Eſſence of Vitriol, as when Liquid and in form of Spirits. Now that Vitriol ſhould yield itſelf by Spirit, and this Spirit impregnate the Spaw, and yet upon Tryal be found no ſuch thing, is all Fiction.-----If theſe Spirits are ſo penetrative as to paſs through the Glaſs and Lute, they muſt require or conſtitute a new Claſs of Spirits, ſuch as are not in Nature, for this is what the moſt ſubtle Spirits of Urine, ſal Armoniac, Hartſhorn, *&c.* do not. As to *Heers* ſaying, that the *German* Spaw conſiſts of Iron, Vitriol, and Ocre, and ſo making Iron and Vitriol diſtinct; *Helmont* who was a better Judge, could obtain nothing from it but clear Water, and a Vitriol of Iron, or the Body of Iron in the Vitriol. As to *Fallopius* ſaying that all acid Springs are Vitrioline, it is true, but that Vitriol muſt be allowed the mineral Compage of Iron or Copper, and it is not factitious but natural; for *Schroder* ſays there are ſundry kinds of Vitriol, but that our Spaw has a vitrioline Acidity is begging the Queſtion. Another Sign of Vitriol, ſays the Doctor, is its vitrioline or inky Smell, but when we examined the Spaw, neither we, nor ſeveral other Phyſicians and Gentlemen preſent, could diſcover this Apporrhea, Vapour, or Smell, nor any thing of Vitriol. But the Doctor in *p.* 13, 14, *&c.* impeaches us of endleſs Contradictions, in confeſſing a *Terra Vitrioli*, which ſtill we affirm is only *Crocus Martis*, *Minera Ferri*, *Terra Rubrica*, *&c.* all meaning the ſame thing, *viz.* a Mineral, or metaline Ingredient, diſſolved by the eſurine Spirit, in vitrioline Spaws, or nitro-aluminous Salt, in nitro-aluminous Spaws, ſuch as ours, ſo that all amounts only to Allum, Nitre, and *Ramenta Ferri*, but you tell us, *p.* 7. that Iron is now in the Spaw, a perfect ſolid Metal, but in *Solutis Principiis*, again *p.* 44. you ſay that Iron is here in its Body, which being calcined yields *Scoriæ* like Iron; and yet, *p.* 80. you ſay that the Salt got out of Iron by burning it in a Candle, infuſing it in Water or Wine, is the ſame with that in our Spaw, here is Iron in the Body and not in Body, and the Salt got out of it, is that great Aperient in the Water; it is not the Body of the Iron, for that is not in the Spaw, and tho' the Mineral of the Spaw calcine whitiſh, yet there are Flakes of Iron, interſperſed, and why ſhould the Minerals calcine into Flakes or Crocus, ſince we have not to do with perfect Minerals, and yet there are Flakes or *Scoriæ* of Iron in the Spaw. Iron will not calcine into a Powder out of which Salt may be extracted, but the precipitated Iron in the Spaw you calcined with a ſtrong Fire, and it turned to a groſs Powder as hard as a Cynder, out of which you obtained a browniſh Salt. How now, Doctor, why ſo many Contradictions, and yet lay them at our Door? That Vitriol muſt be in the Spaw, becauſe of the Tincture of the Water from Galls; Alum alſo, whether crude

Peeviſhneſs; but ſtill he retains ſome of his dark chimical Cant. Whilſt the Diſpute is warm between theſe two Combatants, comes Doctor

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crude or calcined gives the ſame Colour, and has the very ſame Variations on Addition of the like Spirit and Liquors. As to the dark, yellow, ſharp vitrioline Salt that ſweats out of the Cliff, ſharper than Nitre or Alum: But how can this be Vitriol, when there are no Vitrioline Marcaſites all along that Cliff, where we find that Earth or Salt? for upon the exacteſt Search, we could find no vitrioline Stones there. And ſince all Salts reſide in their own proper Beds, where Vitriol Stones are, there is Vitriol bred, and ſo of Alum; and where both Stones are found, there we have Vitriol and Alum intermixed, but Vitriol Stone never affords Alum, *& vice verſa.* That the Cliff out of which the Spring flows is plainly Iron, is a palpable Miſtake, for all along the Cliff is chiefly Alum-Stone, and tho' it fall like Earth, harden by lying, and becomes fuſible in the Fire; we anſwer, that ſcarce a hundredth, yea five hundredth Part of this fallen Stuff is Iron Stone, if any at all; but a Mixture of many Sorts of Stone, Sand, Earth, *&c.* fallen off from the Bank, cruſted together by the Sun's Heat, and hardened by the Sea Salt and Weather, into confuſed Heaps.

As to Waters being impregnated by the Corroſion of the Subſtances of Minerals from the Help of concrete Juices, which extract and corrode mineral Subſtances, as the concrete juice of Vitriol, being of a corroſive Nature, and imbibed in ſpring Water, will corrode ſuch Minerals as it paſſes through, as Iron Alum, *&c.* But ſuppoſing Juice of Vitriol to be in the Water, it is an improper *Menſtruum* for extracting or corroding mineral Subſtances, ſeeing that the eſurine or ſulphureous Salt or Spirit had already coagulated it ſelf upon a mineral or metaline Body, thereby to make up a Vitriol, which neceſſarily has theſe eſſential Principles to concur in this Conſtitution, ſo that if the eſurine Spirit in Vitriol, muſt become a *Menſtruum* to corrode any other Minerals, it muſt firſt depoſite that Body it hath already diſſolved; ſo we ſee if a ſtrong Solution of Vitriol be long boiled in an iron Pot, (which according to the Doctor, muſt make a conſiderable Corroſion) that no more of the iron Veſſel is diſſolved, than is precipitated of the innate cuprous Body inherent in the Vitriol. Nay Vitriol cannot become a *Menſtruum* for mineral Bodies; nor aperient for humane Bodies, till it lay aſide its firſt diſſolvable; whether of Copper or Iron. So that ſhould we grant a vitrioline Juice to be an Ingredient in the Spaw, yet can it not be a fit *Menſtruum* to corrode or extract other mineral Bodies. As for what the Doctor quotes from *Helmont*, take the full Sentence, and it deſtroys his whole Deſign. As to the Doctor's fourth Way how Waters imbibe the Virtues of Minerals by Confuſion, it is a meer Jingle, a confuſed indiſtinct Sound, being only a Mixture of Juices of Minerals abraded or diſſolved.

Now as to the Doctor's great Piece of Ordnance placed againſt our main Fort, it is either not ſtrong enough, or the Gunner knows not how to uſe it; for we urge the nonexiſtence of Vitriol in the Spaw from its not appearing on the chimical Apothecaries Experiments. For had there been either Vitriol or Iron in the Water, by three Hours Calcination it muſt have diſcovered it ſelf either in *Colcothar*, or *Crocus* of Iron: But that Vitriol will calcine white either by the Fire or Heat of the Sun, we deny not, but cannot allow this white Colour to be the Effect of Calcination. For ſuppoſing Vitriol in it, yet take this white Powder, diſſolve, filtre and evaporate, and you have a green Vitriol ſtill, as at the firſt; which it would not do had the Whiteneſs proceeded from Calcination, and not Exſiccation; for what will

Doctor *Tonſtal* of *Newcaſtle* upon *Tyne* on the Stage, a freſh Man, with

will blanch Vitriol, will exſiccate Plants. As to calcining Vitriol white by the Sun's Heat, as in the Sympathetic Powder, the ſame Anſwers ſhall ſuffice, being only an Explication of the Flegm of the Vitriol by the Heat. But ours of your Sediment was a true Calcination by the Force of Fire in a Crucible, yours was only a ſlight Exſiccation. Did Vitriol upon a thorough Calcination become white, you would be right. But Vitriol in any gentle Degree of Heat becomes white, increaſe the Fire it turns yellow; raiſe it yet higher, it is red and Purple, the menſtrual Salt in the metalic Body being expelled. The Doctor's Quotations from *Paracelſus* here are miſapplied, one Part left out, and a third none of his, only added to wreſt his Senſe. As the Doctor's imperfect Metal, Iron was by Force of Fire brought to the *Scoriæ* of Iron, which is Iron it ſelf, ſo had the other, *viz.* Vitriol, been really ſuch, tho' imperfect, for the ſame Reaſon, by Force of Fire it ſhould have been brought to undergo the like change of Colours compatible to it as a mineral Body; he did ſo with the firſt Sediment precipitated in the Water by Galls, why did he not ſo with the other? Vitriol is neither corporeally in *Scarborough* Water, nor percolated, neither perfect imperfect, or any other Way, whatever it is in thoſe Springs mentioned by *Fallopius.* And as for the Inſtance drawn from *Knareſborough* ſweet Spaw containing Vitriol and Iron, yet calcining white. The Doctor takes that for granted againſt which we demonſtratively argue in the Negative; for we demonſtrate that a Vitriol which contains Iron in it is not Vitriol and Iron diſtinctly, but jointly make up a Vitriol of Iron, and that the eſurine Acidity preying upon the Minera of Iron in that Spaw, had got a ſlight touch therefrom, and is a Diſtrict of the minera of Iron, and hath not both Vitriol and Iron. Well, but the Doctor tells us, Vitriol is hot, but has neither told us what Kind nor what Part, whether Colcothar, Salt, Spirit, Flegm, or Oyl. And Iron he ſays is drying, but this is his own *ipſe dixit* without any Proofs, nor are we one bit wiſer by their four Cardinal Qualities, they let in no light to the underſtanding, for many Medicines are of the ſame Quality, but of different Effects. But it is ſtill more ridiculous that Filings of Steel caſt into a Candle, ſhould burn like Salt Petre, and that Filings infuſed in Water till the Salt is diſſolved: then exhale the Water, and caſt the Salt in a Candle, and it will not burn. None ſurely ever knew Salts flame or burn, this is one of the Properties of Sulphur only; ſo we conclude both this and the Heat of Vitriol to be Miſtakes. The Doctor flatly denies that either crude or calcined Alum-Stone, infuſed in Water, will with Gall turn red, as well as with Vitriol, tho' he both knows it, ſaw it, and cannot but remember it demonſtrate before his Face, before a great many Gentlemen at the Spaw, ſtrange Impudence! As to this Experiment and our other Converſation at the Spaw, it was too viſible how he was both galled and pinckt, before many ingenious Phyſicians and Scholars. Next Morning after ſome private Converſation on the Laſhes we had given one another in Print, came the *York* Chimiſt, deſiring to know of the Doctor, in what Part of the Cliff the Vitriol lay, who pointing to the Place, thruſt in his Knife, and took out ſome of the crude Alum-ſtone which laid under the Saline Effloreſcences; that this was Alum-ſtone, the Doctor could not deny, but ſaid its Infuſion would not ſtrike Purple with Galls; we inſtantly made the Experiment whether Vitriol or Alum was in the Water, for if Alum did not give the Tincture, it muſt be ſomewhat elſe, *viz.* Vitriol. But if that did give the Tincture, then it was not from Vitriol, becauſe Alum hath been ſeparated, but never any Vitriol from the Waters. Now this Earth or Stone was put in common Water, powder of Galls was added which inſtantly ſtruck a deep Tincture as did the Spaw. The Doctor before all the great learned Company trembled, turned Pale, fell into a ſudden Paſſion, ſaid, and repeated his Words, that he would take his Oath, that Doctor *Tonſtal* told him laſt Year, that it was Vitriol. The Phyſicians preſent, begged him to produce his Vouchers. Not only the ſucculent but even the crude Alum-ſtone caſt into Water, with a few drops of Oil or Spirit of Vitriol, or Sulphur and Galls, and Galls, would give a Purple, thus the Company broke up abruptly; an acid ſulphureous Spirit or Salt diſſolved in ſpring Water, is a *Menſtruum* to take in the Tincture of Mineral or metaline Bodies, which lie in their Way, and this is a ſulphureous Salt which ſharpens the Water of this Spaw, compatible as well to Alum as Vitriol, is evident from this Experiment, *viz.* that in burning the Alum-ſtone, to make it fit to yield its inbred Salt, a ſulphur is found thruſt forth to the Surface of the Stone, by the Force of the Fire, which flames at a Candle, and burns with a blew Flame, with the ſmell of common Sulphur.

We made a Solution of Vitriol and Nitre in diſtilled Water, mixed and evaporated them in a gentle ſand Heat, till both ſhot into Cryſtals, which were diſtinct. Then we took Vitriol and Alum Salt of each alike, diſſolved them in diſtilled Water, filtred and evaporated to cryſtals which were alſo diſtinct. Then we took Solutions of Vitriol, Alum and Nitre, of each alike in diſtilled Water, which alſo filtred and evaporated, gave three Kinds of diſtinct Cryſtals, *viz.* Nitre ſtiriated, Alum white, Vitriol green, every one in their ſeveral Forms. But to remove all ſhadow of Exiſtence of Vitriol in this Spaw, we took of the Marcaſite Stones of Vitriol, near the Sulphur Well at *Knareſborough*, which is the Minera of Vitriol, and if Vitriol be any where it is there in *Succo*; we powdered them and put on a Solution of Sea Salt, let them ſtand ſeveral Days together in a Matraſs, which by ſtanding in the cold extracted a green Tincture from the Marcaſites, this we poured off and filtred, which with Galls ſtruck a Tincture like the Body of Vitriol; this yellow, green, ſaltiſh Liquor, was exhaled in a gentle ſand Heat, it ſhot into curious yellow tinged Cryſtals, which left an Ocre at bottom, but the Liquor wherein the Cryſtals were, did not turn purple with Galls, but freſh Water added to it made it Purple. The like we found on a ſtrong Solution of *Dantzic* Vitriol, exhaled to an oily Conſiſtence before ſhooting. In the Cliff above the Spaw are clear, bright Talſtones, gritty Parcels of ſcabulous Earth like that in the Spaw. From the whole take theſe Corollaries, 1. That a Mineral in its crude ſucculent Parts may be diſſolved in Spring Water, but when compact it requires a ſulphureous *Menſtruum*. 2. That the Marcaſites of Vitriol and Alum have an embrionative Sulphur, connatural with them, produced out of the ſame mineral Seed. 3. That ſeveral mineral Salts, and other connatural Bodies, may conſiſt diſguiſed under one liquid Maſs, which when taken off by a gentle Diſtillation or Evaporation, each ſhews it ſelf in its own likeneſs. 4. That the Minera or Marcaſites of Alum or Vitriol, do as really give their Tinctures, or yield their Solutions in Water, and do every Way anſwer the Operations agreeable to what's expected, or may be performed by their factitious Bodies. 5. That a mineral or metalic Solution, may have its Parts ſo concentred, as it may not admit of that Alteration of Colours, compatible to the ſame Solution diluted. The Doctor aſſerts that Alum-ſtone neither crude nor calcined, infuſed in ſpring Water receives a Tincture from Galls; but of the contrary, let the Witneſſes of *Scarborough*, and the Gentlemen of the Royal Society (who had the Alum-ſtone ſent them, and made the Experiment) be judges. As to the Doctor's Spring of freſh Water, which riſes out of the Alum Rock at *Whitby*, which gives no Tincture with Galls; it is a Miſtake, the Spring waſhes not the Alum-ſtone, but at the Bottom of the Stone Quarry, under which lies a *Stratum*

of

with an unexpected back Stroak [e] upon Doctor *Witty*, upbraids him with Ignorance of the Waters, want of Judgment and Ability to try

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of Stone like Alum-ſtone, but not of a right Kind, called by the Workmen Doggers, or Catſheads, ſome whereof broken, have a tranſparent Falk in the middle of them. Nor, ſays the Doctor, does Iron-ſtone give a Tincture in Spring Water, as that Spring which riſes in the middle of an Iron Mine near *Barnſley*, but afterwards forgets, and contradicts himſelf out of *Paracelſus*.

[e] Scarborough *Spaw Spagirically anatomized by* George Tonſtal, *Dr. of Phyſick, Printed by* J. M. 1670. 12*mo.* p. 60.

In the Preface, he profeſſes himſelf a Friend to both the Combatants, and ſetting perſonal Reflections apart, he is only for putting in his Mite towards adjuſting the Diſpute. He ſays Dr. *Witty* left off where he ſhould have begun, contenting himſelf with a ſuperficial Obſervation of what was moſt conſpicuous about the Spaw, and trying its Tincture with Galls, hence draws fair Probabilities of his five Principles, and leaves it to others to examine whether they are there or not. As Anatomy hath diſcovered great things in the human Body, he hopes it may do the ſame in the Mineral Kingdom, according to the Rules laid down by *Tachenius*. The Cauſe of all this confuſed Noiſe, is the Liquor of the Spaw, which is commendable, and its Eſſence fit for the Cup of a Prince, but its *Caput Mortuum* being Sand and Clay, is fit only for the Bricklayers Trowel; hence the weak of Digeſtion, and ſtrong in Diſtribution may be helped by it, but others will Experience the contrary; wherefore be gone, ſays he, ye gravely Perſons, leſt you get a Bladder full of Stones to rattle as you run.

It may be objected to me, that laſt Year I preferred *Scarborough*, this Year *Knareſborough* ſweet Spaw. *Anſwer*. 1. Hereby it is plain I am not pertinacious, Conviction works Converſion in me, I adviſed the ſame I uſed my ſelf. 2. For the Gravel I did prefer the Nitre of *Scarborough*, before the Vitriol of *Knareſborough*, here my Miſtake was incurable, till I ſifted *Scarborough* Water in the Fire, *Spagiric* Anatomy ſoon made the Dirt appear. In 1666. Mr. *Tho. Holliard* of *London* cut me, and took away a Stone weighing four Ounces and a half, and in ſix Weeks after I went to *Knareſborough*, remembring Mr. *Stones*'s Son's Caſe, who being cut, the Wound could not be healed up in three Months, before Sir *Theodore Mayerne* ſent him to *Knareſborough*, whoſe Water healed him perfectly in fifteen Days. I drank this Water with White-wine, it freed me from much mucous Matter, which might probably have occaſioned another Stone. In 1667. I went thither again, but the Seaſon being wet, the Water was weak of Minerals, and very likely the Trench about the Well helped to weaken it, by opening other Creviſſes and Outlets for the Water to ouze through. In 1668, I went to *Scarborough*, whilſt there I obſerved what Dr. *Witty* ſays, that when the Water was exhaled from the Body of Minerals they would not reunite with other Water, which ſatisfied me that there was ſomewhat in it beſides the Doctor's five Principles, for the drier Salt is, it thirſts ſo much more for Water. Nor can theſe Principles, ſays the Doctor, be further ſeparated, than by putting Gall to the Water, nor could ſundry who have tried it come better off, but he and they wanted a little of *Boyl*'s Philoſophy; for Fire alone is ſufficient to do this: by it alone, I extracted a pure Nitro-aluminous Salt out of this Water, and a large Quantity of *Fæces* apart; but know not but a great part of this Sand might happen through the Porter's Careleſneſs who fetched the Water, wherefore I wrote to Mr. *Simpſon* to deſiſt publiſhing any thing on the Spaw, before I had ſeen him and communicated my Obſervations; but his Book was in the Preſs. 1669, I returned to *Scarborough*, and tho' I dropt ſome Spirits of Salt into every Glaſs of the Water I drunk, hoping thereby to cleanſe

cleanſe off the Sordes of the Spaw, yet in a Fortnights time, it gave me a Fit of the Stone, which was the firſt from my being cut. I went home and carried ſome of the Water with me, and upon Tryal, I found it contain, 1. Raments of Stone. 2. A Nitro-aluminous Salt. 3. A Glebe of Alum. Their Proportions are, of Stone-Powder one Ounce three Drams, of the Second, one Ounce ſix Drams, of the Third, three Drams; the Quantities of Salt and *Caput Mortuum* are equal, ſo that if five Quarts of Water gave one Ounce of Sediment, in this you ſwallow half an Ounce of Stone and Clay. This is the Reaſon the Sediment would not diſſolve in Water, for the Fire hardens the laſt, nor can Water diſſolve it. This Filth the Spaw has from this exceeding high Cliff, whoſe Bowels are full of Nitre and Alum Stone; it is this Dirt that damms up the Paſſages of the Body after long drinking, ſo as it will neither go backward nor forward till it is aſſiſted by ſome Medicines. Is not this proper to *Scarborough* Water? Does any other do ſo? Do they leave a Sting in their Tail like this, or Stone-powder plaiſtered on the inner Coat of the Inteſtines, diſturbing their periſtaltick Motion, and obſtructing the Attraction of the lacteal Veins? But further, take a large Quantity of this clear Spaw Water, paſs it through a woollen Cloath, boil it to the Conſumption of one half, clear off that Liquor and ſee what Sand you have in the Bottom, which is ſo much of the Nitrous Rock, exhale that Liquor to the thickneſs of Oil, pour it out into a wooden Veſſel, ſet it by in the Cold, and the Nitre and Alum will ſettle into Cryſtals. When it puts forth no more of thoſe, exhale all the Moiſture, put Water to it and filtre it, and you will find more Stone-powder in the Paper. Exhale this filtred Water, burn the Sediment in a Crucible, then diſſolve it in Water, and filtre, and you have the blue Clay, or Alum Glebe. Go on, diſſolve the firſt Cryſtals, filter and exhale, till the Cryſtals be pure and white, ſo will you ſeparate more ſandy Clay; from all which I affirm, that the Nature of *Scarborough* is petrefying, firſt from the Authority of Dr. *Witty*'s famous *Kircher*, *ib.* 8. *p.* 44. *Queritur quid proprie ſit ſuccus lapidificus, dico eſſe ſaxum nitroſum, Aquâ elignatâ.* 2. By Experiment, I find that the Spaw contains little elſe than nitrous Stone melted in Water, beſides the Alum-ſtone that is imbibed in it. A Quart of the dropping Well at *Knareſborough* (a *Stillicidium* from a nitrous Rock) diſtilled in a Glaſs Retort, left fifty Grains of a pure white Nitre and Stone. Hence we ſee the Alum Juice has enabled *Scarborough* to corrode and imbibe more Stone than this dropping Well, not that *Scarborough* either Petrefies more, or as much as the other, which will ſet a Stone Cruſt upon a Loaf, or a Piece of Wood in a few Hours. The Reaſon is, the Alcali of the Alum in *Scarborough*, has in part imbibed the Acidity of the Nitre, ſo as it cannot penetrate the Wood, and leave a Cruſt of Stone, which the other Nitre will do. That Alum is an Alcali is well known to Dyers from its ſaponaceous Nature. Again, Alum put in a Crucible turns to a light porous Cinder, and the Body of all Alcalies are Spongy. Nitre on the contrary fluxes to a hard compact Body; whereby it is plain the Acid is prevalent in Nitre, and Alcali in Alum, therefore *Scarborough* cannot petrefy; but yet he that affirms that this Water has no ſuch occult Quality, muſt firſt prove that it carries no Stone Powder in its Bowels. 3. It is manifeſtly petrefying from the Apporrhea of its *Spiritus lapidifici.* Here are in the Cliff petrefied Muſcle Shells, which Dr. *Witty* ſays is done by the Sea Salt, if ſo, a great Mercy we are not all turned to *Lot*'s Wife by the Uſe of Sea Salt. Again, when the Earth falls down by great Rains, on the Sands, when the watery Moiſture is exhaled it petrefies, this Dr. *Witty* will have Iron. 4. From the Effects the Spaw produces, chiefly in thoſe inclinable to the Stone, which occaſioned a firſt and ſecond Fit to me. This Dr. *Witty* confirms in another who never had a Fit of the Stone till he drunk thoſe Waters, whereby it is plain the Thief was in the Water, and is there diſcoverable by a Chymiſt at all times, and tho' the Nitre may expel ſome Gravel out of the Kidneys, yet the Stone Filings will generate another there, and I have found both in my ſelf, Relations, and Patients, that drinking this Water, will both expel ſeveral ſmall Stones, and breed a great many more, which will break out in Fits of the Gravel when they get Home, and to ſee the Difference between *Scarborough* and *Knareſborough*, take an Obſervation of Mr. *Henry Proctor* of *Farnly*, which I had from himſelf, he was brought very low in a Hectic Fever, and Shortneſs of Breath, he in vain conſulted Dr. *Henry Poor*, then applyed to Dr. *Neal*, who ſent him to *Knareſborough*, where he coughed up ſeveral Stones till he was perfectly cured; had he gone to *Scarborough*, what had been the Conſequence? The laſt Water is alſo dangerous in the Jaundice and Gout. Lord *Erwin* drunk of this Water, went home, fell into a Jaundice and died. Now all Spaws are the moſt deobſtruent Medicine in the World, why then ſhould *Scarborough* kill this Lord, but from the Water petrefying that ſulphureous ſaline Humour in the *Veſica bilaria*, into Stones too great to paſs the *Porus?* Dr. *Witty*, to me, blamed his being too free with Wine, but that could only encreaſe Choler, which unpetrefied, of all other Humours, is the readylieſt purged off. If any think that tho' the Gall be petrified, yet it cauſes not Death in a ſhort time: Let him conſult *Helmont* and *Sylvius*, there he will find how neceſſary the Gall is for the Preſervation of Life. An Alderman's Father of our Town never knew what the Jaundice was till after his uſe of *Scarborough* Water. The ſame was the Caſe of a Merchant's Wife here big with Child; after this Water ſhe had a triple return, and was at laſt hardly cured with Spirit of Wine, Nitre, and Mercury elixerated. Dr. *Witty* knew a Gentleman of *Lincolnſhire*, and his Lady, both fall into the Jaundice from drinking this Water after it was carried and had loſt its volatile Parts. The Gouts Malice is from a petrefying Property of acid Spirits. I never felt this Diſeaſe till I went to *Scarborough*, as ſoon as I got free from a Stone in my left Kidney, I got this in my great Toe a Fortnight, and the Doctor owns frankly, that ſeveral have got the Gout by it for want of due Preparation, tho' no Spaw in the World has leſs need of Preparatives, and more need of Purges. Having now proved *Scarborough* a petrefying Water, and *Knareſborough* not ſo, let us ſee whether *Scarborough* has any vitrioline Spirit in it, and if it have the Spirit of Vitriol joined with the volatile Spirit of Nitre, how does it differ from that deadly corroſive *Aqua fortis*, which is only two acid Spirits inſeparably united? But if the Doctor ſay there is alſo Alum and Salt, then it is ſo much worſe; for a Spirit from all theſe makes an *Aqua Regia*, which diſſolves the hardeſt of Metals. But ſay that theſe corroſive Spirits are extorted by ſtreſs of Fire from their Bodies, which Heat we are not to allow in the Bowels of our Cliff? *Anſwer.* This is a ſmall but no ſufficient Excuſe; for the prolific Seminals of all things generated in the Earth do come to their proper Matricis in a Vapour. 2. If this Vapour be of an ill Quality, it hath the ſame pernicious Effects upon our Bodies, as theſe ſublimed by Art with Fire. 3. Nature can no more make this Vapour to aſcend upward without Heat, than Art can ſublime without Fire, therefore tho' Nitre and Vitriol diſtilled aſunder are good, yet together they ſend forth the moſt deadly corroſive Vapour. But come we to the Doctor's Proofs of Vitriol. 1. Galls turn the Water Purple, ſo does Coal Water Alum-ſtone Water, ſharpened with Spirit of Nitre. The Apothecary of *York* did this with a ſoft Alum-ſtone taken out of the Cliff, without Addition of any acid Spirit. The Reaſon of theſe Experiments, is, the acid Water diſſolves the black Coal, or the blue Stone, and hides the Colour of them in its Pores, the Gall being put in and ſtirred amongſt it, by its Alcali imbibing the Acidity of the Water, what is included therein is excluded toward the Bottom, where what is precipitated appears in its own Colour, the Spirit of Salts adding Luſtre thereto. That Dr. *Witty* could not make the Alum-ſtone, infuſed in Water, ſtrike a Tincture with Galls, was, he only infuſed it, did not diſſolve it, and the Gall could not precipitate the Alum-ſtone from the Water before it was diſſolved, or any of its Parts in it. Nay, he could not make calcined Alum-ſtone put in Water, ſtrike a Tincture with Galls; good Reaſon here alſo, for the blueneſs of the Slate that gave the Tincture was calcined, and then it is white. The Doctor ſent to *Whitby* for Alum-ſtone Water, and to *Barnſley* for Iron-ſtone Water, but neither of them gave a Tincture with Galls. Why ſhould they, being ordinary Spring Water, having taken neither Vapour, Odour, nor Sapor from the Mines? If the crude Alum-ſtone could not alter the Water, much leſs the Iron-ſtone which is a more ſolid compact Body; nor could the Hole in the bottom Stone imbibe diſſolved Iron to tinge with Galls, except the Iron was in *Solutis Principiis*, like that at *Henwick*, which, with Galls, tinctures the Waters wherein it is infuſed, as high as *Scarborough*. Says the Doctor, the Tincture from Galls is neither from Alum nor Iron, but from Vitriol; but if from that, then it is from the Iron that is in it, and then it is *Vitriolum ferrugineum*, but if not from Iron, then its from Vitriol. Therefore it muſt be from Alum that *Scarborough* Water tinges with Galls. The Doctor's Second Proof is from the Sediment in the Bottom of the Oaken Veſſels wherein the Water was carried, which was like *Crocus Martis*, and taſted of a ſtyptick Quality, therefore it muſt be from the Chalybeate part of the Minerals. *Anſwer.* The Sharp Water carried in Oak Veſſels corrodes their inner part, which ſettling to the Bottom with ſome Fæces of Spaw Water, produces a Sediment of the Colour of Oak, which if he had calcined, the Flame would have ſhewn him it was Wood not Iron. 3. The Spaw Water at forty Miles diſtance will not curdle Milk, colour with Galls, nor drink ſo acid as at the Spring. *Anſwer.* Alum curdles Milk as well as Vitriol; the more ſubtle any acid is, it curdles Milk ſo much better; the Water had then loſt ſome of its ſubtle Spirit but not its Vitriol which it never had. The Tincture from Galls is from the unburnt Alum-ſtone; for carry the Water ſome Miles from the Spaw, let it ſtand ſome Days, and it precipitates a blackiſh Powder, which is Alum-ſtone not Iron; for, 1. The vitrioline Spirit and Iron, are too great Friends to be ſo eaſily parted. 2. When the vitrioline Water ſettles its Colcothar without adding Gall to it, it is always Yellow, as in the Baſon and Courſe of *Knareſborough*. As to the Doctor's Iron in this Water, it is becauſe the Earth that falls from the Cliff, hardens and turns to Iron-ſtone, fuſible in the Forges, but when the Smith makes Horſe-ſhoe Nails of this Iron, I will believe him, but at preſent I imagine it only a reddiſh Earth diſſolved, with the Nitro-aluminous Salt, and petrefied in the Sun and Air, to a hard Lump fuſible in the Fire from the Salt that is in it. The Doctor ſays, that becauſe the Water tinges the Excrements black, therefore there is Iron in it. *Anſwer.* They are blue, the ſame with the Alum-ſlate-ſtone. The Doctor ſays he knows there is Vitriol in the Water from its eminent Acidity. *Anſwer.* Spirit of Nitre is acid as well as Spirit of Vitriol. The Doctor's next Argument is from the vitrioline Vapour, or inky Smell of the Water. *Anſwer.* To know the Smell of this Spaw, take oily Water (after the above mentioned Cryſtals are ſettled in it exhaled perfectly dry) add hot Water to it, and ſtir it about, and it ſtinks as ill as the Alum Pans at *Whitby*. Sixſcore Spaces, ſays the Doctor, from the Spring, a vitrioline Salt ſweats out of the Cliff. *Anſwer.* The Nitre ſpires out of the Cliff all along Weſtward from the Spaw, of a white Colour; this he owns to be Nitre, beyond that the Colour turns yellow, from the different Earth out of which it ſweats, for this Truth let him read *Kircher*. The Doctor calcined the black Sediment precipitated from the Water by Galls, and it was of a dark brown Colour, being only the *Scoriæ* of Iron, and there were in it Flakes of Iron broad and thin like thoſe that fly from the Smith's Hammer. *Anſwer.* This calcined Sediment and Body are all one try them, inconcluſive Arguments, and unjuſt Obſervations; he lets fly at Mr. *Simpſon* at the ſame Time, for his too early Performance, before he had laid in a Stock of Learning. Doctor *Witty* returns an Anſwer [f] to both, with an Aſſurance it ſhou'd be the laſt Time, that either

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Experiment, for the Galls precipitate the groſs Parts whatſoever they be, no wonder then it was hard, which had ſo much Stone in it. I calcined this Stone Powder, but could find no Iron in it, nor Iron Flakes. The right Improvement of this Water conſiſts in three Indications 1. To reſiſt the petrefying Property, but where is the Antidote? 2. To prevent the Stone Powder and Alum *Fæces* fixing in the Bowels. 3. In tender Conſtitutions, to prevent the duplicated Salt corroding the Inteſtines cauſing a Dyſentery. From theſe three proceed all the Miſchiefs of *Scarborough* Water.

[f] *Scarborough Spagirical Anatomiſer* diſſected, or an Anſwer to all that Doctor *Tonſtal* hath objected, &c. As alſo Reflections upon *Simpſon*'s *Hydrological Eſſays*, by *Robert Wittie*, *London* printed by *B. G.* for *Nathaniel Brooke*, 1672, 12^{mo} p. 127.

Some may imagine that this Piece comes too late, but it is ſoon enough, if well done; indeed it was finiſhed a Year ago, but had ſome Reaſons to ſuppreſs it till the Revolution of the Seaſon of the Waters; and beſides if this is not better than theirs, it is only fit for Bum-fother.

Tho' my Antagoniſts ſeem to argue againſt me, yet are they not ſo between themſelves; what one calls the Minera of Iron, the other will have the Glebe of Alum; one ſays the Salt of them is Acid, the other calls it an Alcali; one affirms Nitre Acid, the other denies it; one will have the Salt of the Spaw to be Alumino-nitrous, the other Nitro-aluminous. And ſo contentious are they, that other Matter failing, they will quarrel about the Colour of a T--rd, which one ſays is black, the other will have it blue. They pretend an outward Amity, but they can only agree ſo far as to unite againſt me, being *inter ſe Diſcordes.* Their great Quarrel with the Spaw is its great Quantity of Sediment, which remains after Evaporation, but I never obſerved harm from it. *Simpſon* charges my Quotations from Authors, as impertinent, wreſted, or falſly tranſlated; but expecting this from one who has Braſs enough for any Thing, I deny the whole, my Quotations are fetched from the very Authors ch. and p. cited. The Confuſion and panic dread that he alledges me thrown into at *Scarborough* is another Fiction, whereof the many there preſent were Witneſſes. As to Doctor *Tonſtal* in 1668, I met him there, his Wife being my Patient, he took my Advice about the Waters, and ſeemed ſatisfied about the Exiſtence of Vitriol in them; but next Seaſon I found him fluctuating, therefore I could not have the Notion of the Vitriol from him who never ſaw it till 1668, and I had wrote upon it in 1660. It is alſo falſe that I called the *York* Apothecary aſide, and whiſpered in his Ear, that I would lay down the Cudgels and own *Simpſon* for a Brother. How does he in his Book rail againſt the foreign Univerſities and Degrees, tho' to ſave his Bacon he was obliged to tramp beyond Sea to be dubbed Doctor, as we heard before, even with ſuch a Degree as themſelves contemn, giving it only to Noblemen or Gentlemens Servants, to ſhew their Maſters the Ceremony. As to his challenge for each of us taking equal Numbers of Patients to try our Succeſs; as this is what he would be at, to make Experiments on Mens Bodies, but the Country is too well apprized of him now, few will truſt his miſchievous paracelſian Tools or Ternary of fiery Medicines. The Doctor accuſes Doctor *Tonſtal* of Levity, Inconſiſtency, and Diſingenuity, in concealing the Arguments both in his Book, and in his either one or both ſhould draw him into a farther paper War on that Subject. This was followed quickly with a moſt ſatyrical ill-natured Reply,

his Letter to the Royal Society, whereby he proved the five Principles in the Waters, repeats his Arguments briefly, gives a ſhort Hiſtory of the State of Phyſick, before during and after *Hippocrates*'s time to *Galen*, with an Account of the laſt, his Parts, Age, and Learning; then p. 25. comes to Doctor *Tonſtal*'s three grand Indications. 1. That the Spaw has a petrefying Property, without any Antidote, Anſwer, 1. *Kircher* in the quoted Place, is ſpeaking of ſuch petrefying or incruſtating Waters, as really turn Sticks, Straw, Moſs, *&c.* into Stone, not of thoſe that generate the Stone in animal Bodies, therefore the Quotation is impertinent, nor has our Spaw either of theſe Qualities. And as to Nitre, all Naturaliſts in every Age eſteemed it to be of volatile Parts, very penetrating, and a great diſſolver, eſpecially of Metals; of this Mind is *Kircher*, and fixes the petrefying Property upon Salt. For he ſays Nitre partakes of the Properties of Fire and Air, and ſo is full of fiery Spirits, but Salt partakes of Water and Earth, and ſo affords a Craſsneſs to all Sorts of mixt Bodies. Now how a Volatile, Penetrating, Diſſolving Salt, ſhould generate the Stone, I know not; for all Phyſicians have commended Nitre againſt the Stone, and *Kircher* himſelf gives it the Preference to Vitriol, ſaying ſuch Waters purge, incide, penetrate, deterge, open Obſtructions, move and expel the Stone of the Kidneys and Bladder. But whoever ſaw, or in what Author do you read of Nitrous Stones, ſuch Earth there is, but not Stones; but *Kircher* himſelf often raves and is inconſiſtent, as where he ſays that either Salt or Nitre, or Alum, or Vitriol, or ſulphur will afford Matter to petrefy on Sticks. 2. *Tonſtal* would prove our Spaw petrefying from a Parallel between it and *Knareſburgh* dropping Well, which in a little Time covers Moſs, Straw or Sticks in it, with a ſtony Cruſt; but let him ſhew me a Stone ſo generated in *Scarborough* in ſeven Years, and I will yield. 3. He proves it from the petrefied Shells and ſuch like on the Sands and Bank near the Spaw, which are become Stones by this Spring, but the Snakes were as ſure turned into Stone by it; but how is their Body petrefied by it, and not their Head. Nor is there any ſuch in the Cliff, but only on the Sand; and that the Sea petrefies, is plain from ſuch Variety of Petrefactions, and large petrefied fiſh Bones, *&c.* caſt out on all Shores: Coral is a Plant, yet turned to Stone by the Sea; as to the Earth falling down, and turning to Iron, I have anſwered that; and as to *Lots*'s Wife ſhe was not turned to marine, but mineral Salt. His fourth Proof from the Effect of the Water upon himſelf, and one or two more, where he gives a Quotation out of *Helmont* his Prince of Reaſon, which agrees as well to the Reaſon of that Operation, as a Harp and a Harrow, being indeed unintelligible. But pray where is the great Difference? *Knareſborough* brought away that mucous Matter which is the Cauſe of the Stone, and *Scarborough* the Stone it ſelf, both expelled the unnatural Contents of the urinary Paſſages, only the firſt was in Embrio, the ſecond bred; which agrees with the Learned that give the Preference to Nitre in the Stone and Gravel, and he that was wont to breed Stones may do ſo again; his Conſtitution was not altered by cutting; and had he conſulted *Kircher*, he would have told him his Fate. Is it rational to think that whilſt a Man drinks plentifully of this Water, and the Secretion of Urine thereby ſo quick and large, that it is likely he ſhould at the ſame time breed a Stone, and that in fourteen Days Time? And he owns he felt nothing of this the Year before, when he drank it; a byaſſed Man ceaſes to be a judge in the Caſe of his Byaſs. *Tonſtal* had another

Card to play than to tell Truth. I have in thirty Years known a hundred People cured of the Stone by this Water, but never heard of one that contracted it by it. A Lady ſhewed twenty eight Stones that ſhe had voided by it, moſt of them as big as Peas. A *Scotſman* voided half a Gill of ſmall Stones and Sand at once by it, but the Doctor is the firſt that ſuſpected it bred theſe. *Tonſtal* accuſes the Water of leaving thoſe ſtone Tilings in the Body, which are the cauſe of and condenſe into a Stone. Anſwer, This is a ſort of Ocrous Subſtance, which is left in more or leſs in moſt mineral Waters, and tho' after Exhalation it may leave a Sediment, which when mixed with Water, will not paſs the Filtre, yet we have no Reaſon to imagine, they will not paſs our Bodies with the ſame Eaſe they did the firſt Filtre, the Minerals having no Occaſion to condenſe there. But tho' the Fire be a fit Inſtrument to try what's in the Waters, yet I cannot judge it a proper Medium to try its Operation on our Bodies, for the *ſerum* of the Blood is thin as Water in the Body, but turns thick as Glue before the Fire. *Newnham Regis* Water in *Warwickſhire*, turns Moſs and Leaves into Stone, and yet not a more noble Diuretic and Antinephritic Water found in many Ages. The dropping Well at *Knareſborough* is a great Petrefier, yet Doctor *Tonſtal* has ſent ſeveral Patients there, without News of its breeding the Stone, but he imagines that whatever is ſtony breeds Stones in the Body, and ſo is dangerous. But how then do Phyſicians preſcribe Powders of Sparr, Crab Shells and Claws, Oyſter Shells, Pearl, Coral, *&c.* without the leaſt dread of generating the Stone; but granting for once, that the Heat of the Body may condenſe the mineral Parts of this Water, as the Fire doth, yet how ſhall they paſs the Lacteals of the Meſentery, Capillaries of the Lungs and Body, to breed a Stone in the Kidneys, nay if any Thing of this Sort do condenſe, it muſt go off by Siege, and then what harm? Stones indeed are found in all Parts of humane Bodies, from the immoderate Heat of the Parts condenſing craſs Matter; and there are petrefying Waters, yea ſuch as congeal all into Stone, as that at *Claremont* in *Averne*, whereof they make Bridges and other Buildings, but there the whole Matter of the Spring is a lapideſcent Juice (not Water) whoſe Motion hinders its Concretion as water in Motion will not freeze, ſo petrefying Waters differ *ad magis & minus*. Now the Sediment of the dropping Well at *Knareſborough* is only a ſtrong Matter incapable of Diſſolution in Water, or cryſtalization, but moſt of *Scarborough* Sediment both diſſolves and cryſtalizes, therefore the laſt is Nitre, not the firſt. Finally if this Water expelled thoſe Stones, which it is not reaſonable to ſuppoſe it ſhould breed, then is it an excellent nephritic, and noble Remedy againſt this Diſtemper, having prevented the Doctor a ſecond cutting, which it muſt have come to, had they laid longer in the Body till they had been of too large a Size. Many Teſtimonies could I give of the Sovereignty of this Spaw in the Stone. And as to the Benefit of Mr. *Stone's* Son (of *Newton* upon *Trent*, which ſhould have been printed) found from *Knareſborough* many Years, it is True, but he was never fully cured, till ten Years ago, he heard of our Spaw, came to it, was perfectly freed from his Malady, never returned to *Knareſborough* ſince, but drinks yearly of our Water. It is not our Spaw that brings the Stone, or Thief, but it is it that diſcovers it, and brings it away. As to the Patient in the hectic Fever that *Tonſtal* ſays *Knareſborough* cured, by making him cough up Stones every Day. But what Deſign had the Doctor in ſending an Aſthmatic to *Knareſborough*? Did he know that he had Stones in his Lungs, and that the Water would cauſe him to expectorate them; or was it not moſt likely an accidental Cure? what Quality has this Water beyond *Scarborough*, to promote Coughing up of Stones? was it by an occult Quality in the Water, or a miſtaken Fancy in the Doctor? But now let us cleanſe out the Dirt the Doctor has thrown in the

Spaw, *viz.* of Clay and Sand whereby it weakens the Stomach; this is in a great Meaſure anſwered already, but what Water is it, either common or mineral, which contains not earthy Parts, eſpecially the laſt? Did he ever meet with this ſimple Element of Water, even Rain and diſtilled Waters not excepted? Is not our own Bath, and the moſt noted foreign Spaws known to contain much fixt indiſſolvable Sediment? But the Precipitation of his own beloved *Knareſborough*, is worſe off than any of the Reſt, its Sediment being only Earth, and no Salt to carry it off. But I profeſs our Spaw ſharpens the Appetite, promotes Digeſtion, and ſtrengthens the Stomach, nor has Nature provided a better Remedy for a weak Stomach. But here he has brought an unſupported Charge, wanting all Evidence, tho' to my Knowledge, he ſolicited many for ſome, but all rejected him with Scorn. And tho' I could produce a Cart load of Witneſſes of the Excellency of the Spaw in Debility of the Stomach, Flatulency, Belchings, *&c.* yet I produce no other than the Doctor's own Stomach, *Major Samuel Taylor's*, and the Landlord's Tables of the Place, which are always pretty clean ſwept, tho' there is pretty good Proviſion. No Hunters, Farmers, Plowmen, can make quicker or clearer Work at Table. As to the Dirt of the Spaw ſhewn to my Lord *Falconbridge*, his Lordſhip is of too exquiſite Judgment, to be ſo ſlightly prejudiced, eſpecially when the Doctor tells him, he did not know but it might be the Porter's Fault. But that the Sand and Clay are plaiſtered upon the Inſides of the Bowels, diſturb the periſtaltic Motion and Attraction of the Lacteals, hard Words, fit Bugbears for Children, one Abſurdity laid down occaſions a thouſand to follow, nay a frivolous Conceit. Another Miſchief is, that when you have drank this Water a Month with Succeſs, it takes a plaguy jadiſh Fit, and will neither go backward nor forward: The ſame does *Knareſborough*, and with better Reaſon, having only Earth and no Salt; no Water in the World is leſs guilty of this than ours; ſome do ſo in ten Days drinking, others in a Fortnight, ours is acknowledged to hold longeſt out without this Fit. The Lord he brings to atteſt this Truth, profeſſed then ſeriouſly to me, that he could never get rid of him till he took ſomewhat of him, but to no Purpoſe, till I gave him ſomewhat to open the Vents and carry off the Water, and he got much Benefit by it. But all judicious Drinkers ſhould intermit after a proper Time, according to the Nature of the Water. But the Doctor to confirm his Aſſertion, wreſts my Words, for all that treat upon the Uſe of Waters, lay down ſuitable Rules. He ſays the Eſſence of the Spaw is for the Cup of a Prince, but the *Caput mortuum* fit only for a Brick-layers Trowel: Well then all its Parts are good for ſomewhat, but ſure the Vehicle is groſſer than the Spirit, and the calcarious Part ſtill groſſer than that; who can ſeparate a Man's Soul and Body, and then call it an entire Man? If the Salt be the Eſſence of the Water, *Knareſborough* has little or none; for I exhaled ten Gallons of it for ſeventeen Grains of Salt, but a great Heap of Sludge; ſo there is nothing in *Knareſborough* fit for a Prince, till he ſell the extracted Salt of *Scarborough* there (which he draws at Home) at an extravagant Price, as a great Secret to mix with that Water. I deny not but *Knareſborough* as well as other mineral Springs has its volatile ſpiritous Parts, which are not to be got or gathered by Art. But the earthy Part of thoſe Waters, which will not paſs the ſecond Filtre are not uſeleſs, they make the Waters ſafer for drinking, by fortifying the Parts of the Body, they prevent that Ravage and Depredation, which the naked Salts and Mineral Particles in the Water would make upon the fine Veſſels; hence gentle Reſtringents or Corroborators are added to all hepatic and deobſtruent Medicines.——Another frightful Indication is that our Spaw cauſes the Jaundice, and cites the Lord *Erwin*'s Caſe. This by much Importunity he obtained from me in private Converſation, as a Brother, now betrays Society and Friendſhip, and blazes it abroad in the World, let every Man judge if this is the Part of a Gentleman or Honeſt Man, that he certainly did himſelf Miſchief by Wine, but this ſhould not have been blazed abroad on a Perſon of Honour, after his Death eſpecially. But the Truth is, he came to *Scarborough* in a deep Cachexy, very ſick, fitter for a Bed than a Journey, drank only 3 Quarts of the Water in a whole Week, and that contrary to both my Advice and Doctor *Taylor*'s, tho' it went very ill off; what Wine he drank I know not, but a Jaundice he never had; he was carried Home, died of the ſame Diſeaſe of which he came hither, and none can imagine that the Water hurt or killed him. As to the Alderman of *Newcaſtle*, he ſays his Skin was not diſcoulored, only the Water had petrefied the Gall in its Bladder, well ſeen truly, that could ſee what was in the Gall without any outward Appearance. But that a Man ſhould have a Jaundice without the leaſt diſcolouring of any Part of the Body, is contrary to the Senſe of all honeſt Phyſicians, only the Jaundice was fancied and ſo was the Petrefaction, but the Alderman himſelf denied the whole Story in a Letter to me; a Looſeneſs he had, but not the leaſt Symptom of a Jaundice, nor could Doctor *Tonſtal* perſuade him of any Harm received from our Spaw. As to the Merchant's Wife with Child in the Jaundice, no two Pieces of the Story hang together. The Diſeaſe is a Petrefaction of the Gall, the Cauſe the Petrefying Property of our Spaw, the Witneſs is his own Suſpicion, the Diſtemper is proved by a return of the Pain three Times, the Remedy thirty ſix ounces of Blood let, an antimonial Vomit, and a Mountebank Medicine of fiery Spirits of Wine, Nitre and Mercury elixivated, then comes the Saffron Colour on the Skin. The whole Truth is, from my own Scrutiny and Obſervation of others, ſhe had a ſevere Fever with a Stitch in her right Side, and it is ſtrange that Nitre which petrefied the Gall, ſhould diſſolve it again; bleeding ſo largely, and alſo Antimony to cure a Jaundice are Novelties; ſtrange her Gall was petrefied and yet had bilious vomitings all along? but the Truth is, Doctor *Tonſtal* took the Caſe for a Pleuriſy, and treated it as ſuch for twenty Days, then other Phyſicians (who communicated the Caſe to me) were called in, they looked on the Caſe as deſperate, and now blame *Tonſtal* for challenging the Credit of a Cure, which neither he nor they did, not one of them underſtanding the Caſe till after, which truly was an Inflammation of the Liver. But that *Scarborough* is a moſt prevalent Medicine in the Jaundice, let the Caſes of Sir *John Legard* and Mr. *William Hodgſon* who had it every now and then returning teſtify, who were both perfectly cured in few Days; beſides many other yearly Inſtances of like Kind, but never occaſioned one. But come we to the Doctor's own Wife, whoſe Belly neither by Nature, nor his utmoſt Art could be brought to fall after a Child ſhe had born. He talked with me very ſincerely about her, I cauſed him to ſend for her, ſhe came, was perfectly cured and returned well; Is this an ingenious requital, either to the Spaw or me? This Water reduces Corpulency, takes off the Reliques of inveterate Agues, and is moſt beneficial in the Scurvy, ſweetens the Blood and opens Obſtructions at the ſame Time. I could produce ſeveral Letters againſt his Cavils to the Spaw, ſent me from theſe very Perſons who have reaped the Benefit of it in theſe Caſes he diſſwades from it, and why ſhould not the Women with Juſtice cenſure him, who cenſures his Brethren without Modeſty; but to proceed, he ſays the Spaw is ill in the Gout as in his own Caſe. Here he is both Plaintiff, Witneſs and Judge; but it is ſo great a preventative of the Gout, as all Water is, that it deſerves no Reply. That this Water has leaſt need of Preparatives, and moſt need of Purges of any other, is falſe; for in many Perſons if the firſt Paſſages or Inteſtines are not firſt cleared, what a long while is it before it open them, as in Melancholicks and Women: That it muſt have Preparatives is certain, and ſometimes purges alſo. But certain Rules can only be given by a Phyſician preſent. But even his Aſſertion is inconſiſtent, for its purging freely

Reply by Dr. *Tonſtal* [g], which though dedicated to the Royal Society, yet met with ſome pungent Reflections in the next Tranſaction. After this

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makes it moſt ſafe, even in thoſe Caſes he imagines it moſt Faulty, as in the Stone, Jaundice, &c. And tho' he deny Vitriol and Iron in it, contrary to his own Conviction in 1668, yet I have formerly proved them to be really Ingredients, as *Simpſon* denied them at firſt, but unguardedly confeſſed them all at laſt; he fancies that he has got me into a Pinfold, but I am got off before he got it ready, either that at *Wakefield* or *Gotham*. But now Mercy! ſee he places his great Guns and battering Rams againſt *Scarborough*, to ſhake the Foundation and raſe the Building of the Spaw: *viz.* that Vitriol and Nitre joined, make a deadly *Aqua fortis*, thus he deals with the Spaw as *Joab* with *Abner*, tho' it cured his Wife, yet he poyſons it. What tho' theſe two diſtilled together will give a corroſive Spirit? Mr. *Boyl* ſays ſo will Rye Bread: But theſe are the Effects of Fire. Another Sting in the Tail of the Spaw is, that its duplicated Salt may be in danger to corrode the Bowels and cauſe a Dyſentery; but this is no Proof of the Fact, and we have two Aſtringents againſt it, *viz.* Alum and Iron; ſo we are ſafe, and we know and have ſeen it cure bloody Fluxes, which have long reſiſted other Methods. He ſhuts up his Book with a Bravado, to which I anſwer, that I ever ſhall approve a Piece of Art either in him or *Simpſon*, whenever I ſee it, but both have, for Futurity, forfeited a right to my Secrets.

As to the dropping Well at *Knareſborough*, it bubbles out of the Earth in a Meadow Cloſe, about forty Yards from its Origine (which is on the Top of the Rock on the Weſt Side of the River *Nid*) it runs in a very clear ſmall Channel, into a ſpongy Rock about twelve Yards long, which hangs on the Edge of another ſtony Rock, (the whole Ground thereabout being Rocky) there it diffuſes itſelf, and diſtils thro' the Pores of the ſpongy Rock, like a plentiful Rain on the Ground below, which is all become a ſolid Rock, wherein if a Stick, Leaves or Moſs lie ſome time, it cruſts over with a thick Matter, and in time becomes a Sort of Stone like Lime-ſtone, but clearer and ſmoother; from thence it runs into the *Nid*, about a dozen Yards off, where this Water has made a Rock that ſtretches ſome Yards into the River. There is no Appearance of any petrefying Property in the Spring, till it reach the Rock, which ſeems to be made from the Petrefaction, which the Water at the Beginning might receive from the Rock upon which it hangs, from which it may derive a lapideſcent Juice, and is doubtleſs eminently exalted in its Coldneſs from the ſpongy Rock, it being a very cold Water, which Quality meeting with the lapideſcent Juice, and a ſmall Portion of a fixt Salt, doth produce the petrefying Properties. It often Cures inveterate Fluxes of the Belly and a *Diabetes*, when exhaled it leaves a very ſharp and gritty ſtone Powder, a little brackiſh.

[g] *A New-year's Gift for Dr.* Witty; *or, The Diſſector anatomized*, &c. *London Printed by* J. M. 1672. 12*mo.* p. 162.

He dedicates his Book to the Royal Society, appeals to them as competent Judges of the Controverſy, Whether, 1. The Water conſiſts not of the Principles he aſſerts, and thinks he has demonſtrated. 2. Whether it will not leave ſome of its ſtony Matter and Clay in the Drinkers Body? 3. Whether it will not thereby generate Obſtructions, tho' it do purge? 4. Whether it may not breed the Stone in the Kidneys. 5. Whether it be a proper Preventative of the Gout. 6. Whether it is a moſt innocent and ſafe Water for all, becauſe ſome Athletic Conſtitutions get well quit of it. As to the dropping Well at *Knareſburgh*, he took up a Quart of it before it came at the Rock, diſtilled and obtained from it half a Dram of pure Nitrous Salt, thus far it petrefies none; then this, we hear no more either of this Controverſy or Spaw before Dr. *Liſter's*

then he took a Quart of it as it came out of the Rock and diſtilled it, and had fifty Grains of Stone-powder. A ſure Sign of a petrefying Water is, that when exhaled by Decoction or Diſtillation, it leaves a Sand which is Stone-powder. Trying them by putting Stick or Moſs into them to ſee whether they will incruſtate them, is a fallacious Experiment, for they may be petrefying Waters, and yet many Circumſtances prevent this. The main thing requiſite in Incruſtation is, that the Experiment be made while the Water flows immediately out of the Rock, and is in its Act of Corroſion; all Tryals by Petrefaction were thus obtained, but not at a Mile or two diſtance after the act of Corroſion was over, as is the Caſe of *Scarborough* Water; wherefore it incruſtates not, for it runs out of a Lake two Miles direct South of it, through the Roots of thoſe Stony Hills, diſſolves the Stone, and performs its full act of Corroſion before it reach the Cliff, where it corrodes the Alum-ſtone, immediately after which it appears at the Bottom of the Cliff, which is in a Day or two ; it precipitates to the Bottom the Glebe of Alum. A Second Reaſon of Incruſtation is, that the ſaline Water which has newly corroded Stone, does penetrate through the Pores of what is laid in it, theſe it may leave a Cruſt upon, and the more porous the Body laid in the Water is, it petrefies it ſo much ſooner. There is another Well a Mile from the dropping Well, which petrefies Moſs only, and this is ſo hard, that one may walk over it as over a Bridge. The *Cauſa ſine qua non* of petrefying Water, is that the Saline Water paſs through the Stone whilſt it's in Embrio, and therefore diſſolves it ; now the Sulphur Well at *Knareſborough*, and the Alum Well at *Malton*, leave not a Grain of Stone-powder. All Spaws have their Name and natural Property from the mineral Contents they bring along with them.——The Reaſon of Dr. *Witty*'s Railing at me, is meerly my diſſent from his Opinion ; if I ſeem harſh with him, it is all in his own Words retorted upon himſelf, ſo it is only fathering his own Child.——In his Preface he ſays, Dr. *Witty* has ſent him a gilded Pill but deſperately bitter, and as to Secrets he can tell him none ſince *Culpeper* has rifled his Cabinet, and laid them all open, and if he make a rejoinder to this, he contradicts both his own Book, and Title Page and Promiſe. If he chuſe a Second, I ſhall find another ; and I have cut out Work ſufficient for them in the twelve following Propoſitions, one whereof anſwered, I will recall the reſt. The Doctor recommends *Scarborough* Spaw good in all Diſeaſes, but take theſe Inſtances of it. A Gentlewoman in *Lincolnſhire* came there with a Letter of Recommendation to Dr. *Witty*, but ſent for me, would not give it him, becauſe they ſaid, they all knew his Anſwer before they aſked him. Mr. *Lamplugh* conſulted him for a Hectic and Conſumption, he adviſed him to drink the Water a Fortnight, which he did, and died ſoon after. My Lord *Cr*-----'s Nephew was by him, contrary to the Inclination of their Phyſician in Ordinary's Advice, ſent thither for an Aſthma, the Effect was the ſame. What ſhall I ſay of Mr. *Atkins*'s Caſe, ſent hither for a Heat and Scalding of Urine ; the two Mr. *Weſtby*'s in a Rheumatiſm ; Mr. *Thorton* of *Newton* in a Paralytic Scurvy, tho' we have his Caſe and Sir *J. B*'s Lady in a Jaundice regiſtred among the Cures, becauſe it ſharpned their Appetites for a few Days ; for as the Water is bad in Stone, Gout, and Jaundice from its petrefying Quality, ſo is it in the Rheumatiſm, from its nitrous and aluminous Qualities ; but *Knareſborough* Sweet Spaw containing only Vitriol, is co-natural to the Ferment of the Stomach, agrees with all Conſtitutions, offending none. Hence it cured Mrs. *Shaw* of *Ferribill* of a violent Cough with Spitting of Blood, and Mrs. *Barker* of *Doar*, and Mrs. *El-*

lis of *Beverly*, of dangerous Ulcers of the Kidneys.——As to Mr. *Simpſon*'s Anſwer, it is a Pity ſo unripe Fruit ſhould fall from ſo green a Tree, more Deliberation in Writing, and peruſal of his Library, and Laboratory, would have mended it much for the peruſal of the Judicious and Scholars; but I have ſaved him the Trouble of further Experiments, aſſerting that the ſabulous Matter in the Water, is the Glebe of Alum, and not the *Minera* of Iron, nor need he diſtil the Urine of the Spaw Drinkers to ſeek the ſtony Matter there; for if a gentle Sand-heat will precipitate the Matter to the Bottom, much more will a natural Heat precipitate it in our Bowels. His contending for Alum to be an Alcali, and Nitre an Acid, affects not my Argument, why this Water petrefies not Wood put into it, for he owns an Acid and an Alcali in the Water, which is all I wanted, and by his Oppoſing me, he has only made room for the Doctor to break a Jeſt upon us both. That Nitre is *Filius Terræ*, is ſeen from his red Garment, that a Pound of it by Diſtillation, will afford a Pound of an extream acid Spirit, that it is a ſulphureous inflammable Salt, that mixt with Alcali of Tartar, cauſes a great Ebullition, are ſufficient Demonſtrations of its Acidity. That a ſaponary Quality is *proprium quarto modo*, to an Alcali, is granted by all, that Alum has ſuch a lixiviate Proprety, Dyers know as well as I.

Now to the Book, It is certain that from Galls tincturing the Water, he takes his other four Principles from Probabilities inſtead of Arguments, even tho' I proved them all fallacious in excluding his Vitriol and Iron; and now as to Salt, he grounds that on the Spaws nearneſs to the Sea, though there are ſeveral freſh Springs as near the Sea, and at *Bermudas* they dig Wells of freſh Water within twenty Yards of the Sea; but having reviewed an Anſwer againſt Vitriol and Iron in the Spaw, and proving Stone-filings in the room of them; he ſends a Letter to the Royal Society with ſeven or eight Extracts, taken out of the Spaw; this Letter was printed four Months after my Piece was publiſhed, yet I am blamed for leaving it out, but ſhall not overlook it now. 1. He is diſobliged with Dr. *Foot* for mentioning his Principles of Iron, Alum and Nitre, and leaving out Vitriol, as tho' Iron could be in it without Vitriol, and as to Vitriol, he ſays it is moſt conſpicuous at the Well; a great Untruth, being only Nitre as the Cryſtals prove by his own Confeſſion. But why upon his ſecond Experiment has he omitted to preſent us with what he calls Vitriol? This had been more convincing than all his other Spirits and Extracts, which let us examine. The Firſt is the Water exhaled till the Moiſture is conſumed, and only the Minerals remain; if this be properly an Extract, then no Miſtakes. The Second is, diſſolve this Extract in Water, filtre it, and there remains a little inſipid Earth; exhale the filtred Water, and there remains the Salt, which is moſtly Nitre, diſſolve this in Water, filtre it, and there remains in the Cap-paper the Alum; this is ſometimes found to be like a cryſtaline Sand, but why not more modeſtly expreſſed as elſewhere. The groſſer Part of the Minerals are Metals, and why muſt not the Salt of Alum ſtop in the firſt Filtring as well as in the ſecond? but exhale the ſecond filtred Water, and there is a Salt. The Difference between theſe Salts is in the Degrees of Heat. This diſſolved again, and evaporated, there is another Salt. When the Spaw Water is firſt ſet on the Fire, there falls to the Bottom a yellowiſh Powder; but he will not own what I told him, that this is the Glebe of Alum. Dr. *Witty* being reproved for conſtituting Five Principles before he had tried the Water, makes them Ten. Now what new Light has he given us from all thoſe Experiments? even when next he has calcined the Body of Minerals, which before he told us were White, now he tells them, they may ſee they are of a manifeſt red Colour from the Iron, but whence this Redneſs, but from the Sand and Clay? Nay, he diſtill'd ſix Ounces of the Minerals, and got half an Ounce of Spirit from them to ſend up with the reſt of the Pacquet; but how could he poſſibly procure a Spirit from them, without they were well ſtuft with Sand and Clay? this is giving Pains to contradict himſelf, for if the Salts fluxed in the Retort, they could never ſend up a Spirit, and flux they muſt without a large Mixture of Sand or Stone-powder. My firſt Argument from *Kircher* for the petrefying Nature of this Water, he rejects, calling the Author raving, uncertain, wavering, *&c.* but the Author's own Words are ſo plain they want no Interpreter, nor is there room for Contradiction; and any Salt Water, that will ſerve to diſſolve Stone, will make the Water petrefying, and that no Salt in Water that diſſolves not Stone can petrefy, this is abuſing Authors. The ſecond Argument is from Experiment, whence I ſhew that *Scarborough* is equal to all petrefying Waters, in their peculiar Property of carrying in them diſſolved Stone, which is common to no other Waters. The dropping Well and it, only differ in this, that one incruſtates Sticks, and the other Peoples Bowels, and the Salt of the firſt I declare is Nitre, as well as of the laſt; but let their Salts be what they will, if both diſſolve Stone, and carry it in their Interſtices, they are doubtleſs petrefying, and both of them exhaled leave a gritty Stone-powder, and himſelf confeſſes that both have a lapideſcent Juice. The Third Argument is from the Apporrhea of the lapideſcent Spirit, and the Muſcle-ſhells we find petrefyed on the Bank, which he ſays were caſt up by the Sea, and ſo perhaps were the three Cart Load of Earth that lies petrefied at the Cliff Bottom. He ſays, ſurely the Sea petrefies any thing that has a lapideſcent Juice, and I add, ſo do all the four Elements; for *Tachenius* proves, that a Flint-ſtone of One Hundred Pound Weight, laid in the open Air, will yearly gather Ten Pound Weight, or as to him that has a lapideſcent Juice or tartarous Humour, contracting the Stone ſooner if he eat much Salt Meat, this is againſt Reaſon and *Helmont*'s Experiments. In my Fourth Argument from the Effects of *Scarborough* upon myſelf, he ſays *Knareſborough* brought away Mucus or the Origine of a Stone, *Scarborough* a ſolid Stone, and prevented a ſecond cutting; the firſt can never breed the Stone, being contrary to the Nature of Vitriol, but it is perfectly agreeable to Water loaded with Stone-powder. I know Vitrioline Waters let fall their Colcothar, as Alum Waters do their Glebe. *Malton*'s Spaw lets fall its Glebe, yet I like it not worſe, ſeeing it has no Stony matter in it. Hence it is plain, 1. Were I for Intereſt, I ſhould not applaud *Malton* which is ſtill near the Doctor, and he owns it of like Virtue, and as quick and ſtrong Operation as *Scarborough.* If he pleaſe, he may bring the Company from *Knareſborough* thither. 2. It is a Fault in *Scarborough* Water as a petrefying Water, not as an Alum Water, and that it caſts a gritty Stone-powder to the Bottom. One Experiment the Doctor made which he has not mentioned to the Royal Society, *viz.* That two Quarts of it paſſed cleaverly through a Filtre, cold, and left not a Grain of Sand behind, ſo does a Solution of Pearl prepared with Spirit of Copper, in Spring Water, and yet you may have all the Pearl again in the Ladies Water that drank it, and this 100 times over. His Inſtances about the Serum of the Blood thickening before the Fire, and Sack leaving a purulent like Matter on a hot Fire-ſhovel, are both impertinent. It is the Action of the Veſſels that keeps the firſt in Motion, and retains its fineſt Parts from exhaling. That like *Pus* in the laſt, is the volatile Sulphur and Salt united, and become a *tertium quid.* But to the twelve famous Propoſitions, the *ſumma totalis* of all my Writings on *Scarborough* Spaw, any one of which confuted I recant the whole, 1. *Scarborough* Water, has Stone-powder in it, which it leaves in a Sand at the Bottom of the Veſſel wherein it is exhaled. 2. *Scarborough* Spaw is parallel to the dropping Well at *Knareſborough*, which leaves the like Sand. 3. The Water that leaves this Sand, when exhaled, has a lapidiſcent Juice, and is petrefying. 4. The Water that has this Juice, and is petrefying, is of bad Conſequence in the Stone, Gout, and Jaundice. 5. This is the Character, and that whereby *Scarborough* Spaw is diſtinguiſhed from all others in uſe, that it takes a reſty jadiſh fit ſooner or later. 6. Alum-ſtone diſſolved in Water, give a purple Tincture with Galls, the Doctor confeſſes this; therefore the Tincture with Galls is not

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ter's Treatiſe of the Medicinal Waters of *England* [h]. But Dr. *Simpſon* and *Tonſtal*, were not all that Dr. *Witty* had to do with, for in [Number 52.] [i]. of the *Philoſophical Tranſactions*, we find him attacked

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from Vitriol, but from Alum. 7. All Waters that have diſſolved Iron-ſtone, contain alſo Vitriol. 8. All Salts that exude out of the Cliff, are Nitro-aluminous, not Vitriolic. 9. The Cart Loads of Earth fallen from the Cliff, is not Iron-ſtone, but petrefied Earth mixed with Pebleſtones. 10. The precipitated Powder in the Bottom of the Veſſels wherein the Water has ſtood is Glebe of Alum. 11. If Vitriol be joyned with the Nitre in *Scarborough* Water, it is corroſive, which is worſe than all ſaid againſt it beſides. 12. Dr. *Witty* muſt yield me the Victory, for Truths ſake, or in Print.———If any want to ſee Railery, Invectives, wreſting of Words and Senſe, and perſonal Reflections, *&c.* in perfection, he may conſult theſe Authors on this Controverſy, eſpecially *Tonſtal* and *Simpſon*; for tho' this Book be dedicated to the Royal Society, yet in the *Tranſactions* [Number 85.] *p.* 5019, 20, 21, we find them very ſharp with theſe Authors for their Ill-nature and unbecoming Behaviour, and alſo ſuſpicious of the Truth, and unſatisfied with their Attempts, ſaying, we cannot but take publick Notice in theſe Tracts of the Diſcourſes of that Subject, that come abroad by the Preſs; wiſhing only, that the Examiners of ſuch matters as well as all others, would conſider them without Partiality and Invectives, with all Care and Sincerity, thereby to Stock the Philoſophical Magazine with ſuch Obſervations as commend themſelves by their Truth and Exactneſs; for the finding out of which, in the matter of the *Scarborough* Spaw, it ſeems to be very neceſſary to commit the Examination of what they both have delivered thereon to ſome, as well impartial, as intelligent Naturaliſts, to review what they have written, and repeat the Tryals they have made, *&c.* And again, we wiſh for further Examination of this Water, to be undertaken in an amicable and unbyaſſed way, and by the Conjunction of ſome able and diſcreet Perſons, with theſe two Diſputants, that have hitherto very unbecomingly inveighed againſt one another.

[h] From this time we hear no more of this Spaw till ten Years after that Dr. *Liſter* favoured the World with his firſt learned Diſcourſe on the Medicinal Waters of *England* in 1682, whilſt he lived in *York*, *p.* 31. He ſays there is nothing in *Scarborough* Water beſides Salt of Lime-ſtone, Ocre, and Calcarious Earth. Ocre, he ſays, *p.* 47. is the Metal it ſelf of Iron, and therefore certainly contains in it ſelf the Principles of Vitriol, which is thus demonſtrated: Let Ocre be often and carefully waſhed till the Water will no longer receive a Tincture from Galls, yet if you lay it by in a moiſt Place a little time, vitrioline Effloreſcences will riſe out of it as out of the *Pyrites*; and the ſundry kinds of Ocre have been one great Reaſon of the Difference among Writers on Mineral Waters. But it is moſt ſurprizing to contend for Alum in this Water, which is a Purgative, and the other an Aſtringent; and for that which they call Alum Glebe, (*p.* 76.) if theſe Gentlemen would truſt the Loadſtone, they had been ſatisfied; for that Ocre which ſubſides in the Water, by Galls, Standing or Carriage, is moſt obſequious to this Stone; or if they will lay it up in a moiſt Place, they might in time have ſeen it put forth green Vitriol. He obtained an Ounce and a half of Sediment from twelve Pints of *Scarborough* Water.

[i] In theſe Words of Dr. *Witty*'s, theſe Waters loſe all their Virtue, yea their Quantity and Bulk alſo, tho' in Glaſſes, and under the Hermetical Seal, if removed from the Fountain-head, *&c.* It is univerſally agreed, that ſome ſorts of Medicinal Waters loſe their Virtue, if removed to any conſiderable diſtance from their Fountain-head, but others do not, at leaſt ſo ſoon.

To the laſt Claſs belong *Barnet*, *Epſom*, *Dulwich*; to the firſt belong *Tunbridge*, *Aſtrap*, and *Stall-bridge* Waters, *&c.* The common Cuſtom of the Sick, taken from the Advice of their Phyſician, and the Experience of all in repairing to thoſe reſpective Places, ſufficiently prove the common Conſent thereto. But tho' the Effect be ſo common and obvious, yet its Cauſe is not ſo plainly diſcovered. It is commonly ſaid, that this Loſs conſiſts in the flying off of the moſt ſubtle, penetrating, and ſpirituous Parts, not to be impriſoned by any Incloſure imaginable, but will find an eſcape, and leave the Waters deſtitute of their Virtue, and decreaſed in Quantity too, and probably of their Weight: That this may be the Caſe our Author does not poſitively deny; but owns that it's the Sentiment of very many, if not all Phyſicians and Naturaliſts that have conſidered it, and he embraces the ſame Sentiments, and only relinquiſhes them with Suppoſition. But finding ſomething in *Tachenius* relating to this, he is encouraged by his Authority to reſume ſome Conjectures concerning the ſame, and deſires the Publiſher to give Notice of the following Conjectures and Queries, that the Learned may reaſon and find out the Truth of them. 1. Did ever Chymical Reſearches diſcover that ſuch Waters ever yielded either a vinous, acid, or other ſort of Spirit, whether inflammable or not inflammable, or flying over the Helm from the Fire. 2. Whether all the ſorts of Waters, when they are moſt cloſely ſtopt up, and ſo let ſtand, or conveyed to ſome diſtance, do not let fall a Sediment, commonly yellowiſh, or ſome ſuch Colour, when they are become effete in their Veſſels. 3. Whether when they are let ſtand only, and not moved by Carriage, they do not ſooner precipitate an Ocre to the bottom, and ſo become ſooner caſtrated. 4. Whether ſuch an Ocre is not found in all Spring Heads, and Streams alſo, but more in the firſt than laſt, and eſpecially if the Stream be very long. 5. Whether two Bottles filled with this Water, the one well ſtopt, the other not, and both either let ſtand, or equally moved, will not equally loſe their Virtues in the ſame ſpace of Time, have the ſame precipitated Sediments, be of the ſame Taſte, Colour, and alike diminiſhed in Quantity, with divers other ſuch Circumſtances. 6. Whether two Veſſels diverſified in their Matter, and conſequently in their Parts, Pores, and Figures of the whole (as a Glaſs Bottle, and an Ox Bladder, or any two ſuch like) filled with ſuch Waters, will not yield the like Phænomena in all Circumſtances, as mentioned in the fifth Query. 7. Whether it can be deviſed to prevent all Precipitation of a Sediment in the Waters veſſeled up, and then to obſerve thereupon, whether their Virtues could not be kept entire during ſuch a Prevention. 8. Whether ever any Obſervers found the Waters enervated, but they found withal another either let fall to the Bottom, or ſticking to the Sides of the containing Veſſel. 9. Whether the Phænomenon of loſs of Virtues of ſuch Waters, may by an Hypotheſis of an inteſtine precipitation of their Parts wherein theſe Virtues conſiſted, be as well, if not better explained, than by the Hypotheſis of the loſs of Spirits through all Veſſels and Cloſures whatſoever? which Hypotheſis he only propoſes, and leaves to the Learned to conclude. 1. Then it is generally received, that if there be any Medical Virtues in Minerals or Metals, it conſiſts in their Sulphur, which is of a volatile and alcalizated Property, eſpecially when not intimately mixt with it, or after commixion perfectly freed from their Mercurial parts. 2. It is as much received even to become a Chimical Maxim, that Acids and Alcalies mutually operate upon one another to a Satiety, to an abating (and if Circumſtances correſpond) to an utter loſs of their former Activities, and laſtly to a Production of a *tertium neutrum*. 3. Again, they alike conclude, that Salts act beſt in a State of Solution, all which Premiſes centre in this Hypotheſis, that the Waters which materially make ſome Springs paſſing under Ground by a Vein of ſome Metal, which yet is *in fieri*, having firſt taken up of an acid Salt, which is in the Earth, thereby catcheth hold of the immature Sulphur of

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ed by Doctor *Daniel Foot*, chiefly concerning the Cauſe of the ſudden Loſs of the Virtues of mineral Waters. And Doctor *Highmore* [k] to

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that Metal and preſently glides it along with it ſelf to the Springs Orifice, and from the Moment of the Sulphur and acid Salts meeting and contact, begin a mutual Action and Reaction upon one another, which never ceaſeth, till both are imperceptibly ſpent and blended into a new Body, which then the Water lets fall, and we call it Earth, Ocre or Sediment; after the Production of which Ocre, the Medicinal Virtues of the immature Sulphur are lockt up in the inſeparable Embraces of the acid Salt, and ſo are loſt or at leaſt diſappear, but this mutual Action and Reaction may be loſt, till the Waters iſſue out of the Earth, and for ſome ſmall Time longer, and ſo long their medicinal Virtues are to be imparted and no longer. This is *Tachenius*'s Hypotheſis, let it be tried and live or die as it deſerves.

[k] *Philoſophical Tranſactions* N°. 56. p. 1128. Some Conſiderations relating to Doctor *Wittie's* Defence of *Scarborough* Spaw by Doctor *Highmore*, in a Letter to Doctor *Beal* of *Yeavil. Dec.* 17, 1669. Doctor *Wittie* has indeed gotten Ground of his Adverſary *(Simpſon)* but whether either of them has got right on his Side, he cannot judge, being a ſtranger to that Water, much differing it ſeems from thoſe in his Country, and therefore may partake of other Minerals, and more both in Quantity and Number. But whether all theſe diſtinct Minerals reckoned up by the Doctor, do conſpire to make up this medicinal Water, and that none of them can be left out may be doubted, and the Doctor himſelf ſeems to ſpeak doubtfully of Salt, p. 89. Next he wonders why the Doctor ſet Alum in the Front of the Minerals that conſtitute his Spaw, for Alum dries, aſtringes and thickens. Now how the Water ſhould be ſo great a deobſtruent, and ſo beneficial to Hypocondriac and Cachectical Perſons, being impregnated with ſo great an Aſtringent, he underſtands not, nor does the Doctor ſatisfy us. Beſides he acknowledges Alum Water will not tinge with Galls, as he confeſſes this will. Further why he ſhould make Iron and Vitriol two diſtinct conſtituent Minerals of this Water, and call it *ferrum Vitriolatum*, I ſee not; as if Vitriol were a ſtranger to Iron, or that they were here two diſtinct Minerals, when indeed Iron alone affords both. Vitriol is the Salt of Iron, and there is no Iron without it, and that Vitriol which he ſays is found alone on the Rocks near this Water, will by the ſummers Heat be hardened into Iron, which in a Forge will melt and run. So that tho' Vitriol may be found alone without the Iron-ſtone, it is not becauſe it is no Ingredient in the Compoſition of Iron, which cannot be Iron without it, but becauſe theſe vitrioline Earths are not grown to that Perfection, but either by ſome accidental Mixture of other Bodies, is clapt up into the Compoſition of ſome other Metal or Mineral, or elſe wants theſe Bodies, or Time that ſhould fix it into Iron. And truly the Opinion of the learned Doctor *Jordan*, that Waters are tinged by Minerals while they are *in Fieri*, may yet have much of Truth in it, however ridiculous ſome may imagine it. What can the Water receive from a perfectly fixt and wrought Metal, in its Paſſage by it? But when the whole Maſs is in *Solutis Principiis*, no Part fixt by its Neighbour, but every one at Liberty, the Water paſſing through may eaſily lick up ſomething of every Body diſſolvable in it, and that the Bodies may exiſt in this State of Liberty for many Years, without a *Copula* to fix them into ſuch a Metal, is not a Matter either unintelligible or ridiculous. The Salts in the Earth only combine with different Bodies, and make up ſeveral compounded Maſſes, which yet when diſſolved, may communicate the ſame Properties. The Vitriol of Copper makes Wa-

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both which he returns an Anſwer in N° 60 of the Tranſactions. [1] I know not whether Doctor *Simpſon* rallied his Strength anew and made a

ter Acid, as well as that of Iron. Doctor *Witties* colouring of *Roman* Vitriol, p. 21, is falſe. P. 120, he is diſpleaſed that his Adverſary allows the Saltneſs of the Sea to proceed from foſſile Salt, or from ſuch Rocks and Bodies of Salt which are often found in the Sea, beſides the Saltneſs diſperſed throughout the whole Body or the Earth eaſily imbibed by Water. The Doctor will rather have the Peripatetic Torrefaction by the Sun to be the Cauſe, which ſeems very improbable, for the Sun's Heat cannot act more powerfully on the Water to this Effect than Fire doth, yet this will never give Saltneſs to the Water, that is not already impregnated with ſaline Particles. And his Argument againſt *Simpſon* ſeems not convincing, namely, that it would, if cauſed by foſſile Salt, kill all Fiſh whether Sea or freſh Water Fiſh, &c.

[1] Doctor *Witties* Diſcourſe in Anſwer to Doctor *Foot*, and Doctor *Highmore*, concerning Mineral Waters and Extracts made out of them. After the common Compliments to the Society and publiſher, he intimates their Omiſſion of Vitriol in mentioning the Principles of *Scarborough* Spaw in N° 51. He next takes Notice of Doctor *Foot*'s Notes and Letter (in N° 52.) concerning the volatile Parts of Mineral Waters, together with his Queries, to which he declined returning an Anſwer, till Buſineſs called him over to *Scarborough*, where he renewed his Experiments with the utmoſt Exactneſs. As for Doctor *Foot*'s referring to *Tachenius*, our Author could not have him in *London*, therefore can ſay nothing to his Principles, only he is certain theſe Kinds of Mineral Waters, are more pleaſing to the Palate, and effectual if drunk at the Fountain, than when carried to a Diſtance; yet ſome of them endure carriage better than others, ſuch of them as are impregnated with a Body of Minerals, as *Scarborough* and *Malton*, *Knaresborough* ſulphur Well will ſuffer leſs by Carriage than the ſweet Spaw at *Knaresborough*, which has imbibed little or nothing but the volatile Spirits or Vapour of ſome Minerals, which upon Carriage quickly exhale.

Now though *Scarborough* Water will endure Carriage, as far as any I know of, and yet retain its purging Quality not only Days but Weeks, when it ſtinks, becauſe of its large Proportion of mineral Salts, which are not loſt by the Carriage, but ſerve to puſh it through the Body, yet it ſuffers a great Alteration and Decay of Virtue, being conveyed to a Diſtance; which probably proceeds from the Loſs of ſome volatile Parts, whereupon are alſo loſt ſome alterative Properties, by which it ſhould fortify the Craſis of the Stomach, and other nervous Parts, or open Obſtructions, or expel the Stone, &c. therefore it is that I never ſaw a noted Cure done by it at a Diſtance. Nor can it be ſuppoſed that theſe Waters, which have in them a Body of Mineral Salts, can want theſe volatile Spirits which others poſſeſs, that have no Minerals at all. Nay it is plain that even *Scarborough* Water drank at the Town, tho' but one quarter of a Mile from the Spaw, has not near ſo pleaſant a reliſh upon the Palate, as it has at the Fountain, (and ſome find it not ſo operative) but whether that Alteration comes from a ſudden Loſs of ſome Spirits, I will not raſhly ſay, but chuſe rather to prove it thus. It is ſuch an Alteration as we obſerve in Wine or Ale, which after a while loſes the briſk Taſte or Reliſh, which it had when drawn out of the Caſk, whereby it is not ſo grateful to the Palate, while yet perhaps, there is little or no loſs of any vinous or frumental Spirits; but then after a Day or two it turns of a whitiſh Colour, and ſuffers ſome Degrees of Putrefaction, tho' I could never diſcern any Diminution of its Quantity. To prove the Truth of

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a freſh Attack in his *Zumologia*, but I ſuppoſe neither Doctor *Wittie* nor Doctor *Tonſtal* made any further Sallies, for the laſt had loſt all Argument

my Aſſertion concerning the Principles of this Spaw, I preſent them to you in their ſeveral Parts, with the Manner of their Extraction. As to Vitriols being ſufficiently proved to be one of its Principles, I refer to p. 42, 43, and 44. of my Book. For being in its volatile Part it cannot be repreſented to the Senſes at a Diſtance, tho' it be conſpicuous at the Well. After Diſtillation or Evaporation of the ſtrained freſh Water, there is found an Ounce of the Minerals in five Quarts, and in dry Weather ten Drams, which I take to be the product of the five abovementioned Principles impregnating the Waters, it ſeems to have a compound Taſte of ſharp, ſalt, acid, ſtyptic, and another different from them all. Diſſolve theſe Minerals in pure ſpring or diſtilled Water, then filtre it through Cap-Paper, you will have a little inſipid Earth in the Filtre, but the Water will be exceeding brackiſh; evaporate all that Water, and there remains a Body, which being duly prepared and time allowed it, will ſhoot out into *Stiriæ* an Inch long, being ſet in a Cellar or moiſt Place to cryſtalize, this I take for Nitre being of a nitrous Taſte; diſſolve this Body in diſtilled Water, filtre it, the Water is brackiſh, and in the Filtre will remain a Powder, which ſeems to me the aluminous Part; this is ſometimes like a cryſtaline Sand; I think the Difference in the Shooting ariſes from the different Degrees of Heat, which is given it; evaporate this Water away and you have a Salt, in both which and the former, are ſmall *Stiriæ*, which I take for nitrous Particles interſperſed. This Salt I have ſometimes depurated till it was as white as Chalk, and ſtill it retained its Saltneſs. Now whether this is marine or mineral Salt, I leave others to determine; but I ſuppoſe it chiefly the Product of the Minerals, with a little Addition from the Sea. When the Spaw Water is firſt ſet on the Fire, there falls to the Bottom a yellowiſh Powder, which if you filtre, the Water ſtays behind; whether this be the Ocre that ſubſides when the Water is carried to a Diſtance I am not poſitive, but the Colour of both is the ſame. The Sediment that falls to the Bottom after the Tincture of the Gall, I take to be Iron. Becauſe *Simpſon* has made a noiſe about calcining the Minerals, which he ſays were white, thereby he excludes Vitriol and Iron out of the Combination; I calcined them, and found them plainly red, which can never come from Nitre, Alum, nor Salt; therefore muſt from Vitriol or Iron, but moſt probably the laſt. If you take the Body of Minerals after the firſt Evaporation of the Water, calcine and rub it into a fine Powder, then ſweeten it in pure or diſtilled Water, and afterwards filtre it, you will find a nitrous Salt, and a larger Quantity remains in the Filtre, cryſtalized through the more vehement Heat of the Fire. There are alſo other Parts which I fetch out of the Body of Minerals, which doubtleſs contribute much to the Cures performed by the Water, and drunk down in other Vehicles are very ſerviceable in the Hippo; as out of ſix Ounces of the Minerals, I extracted firſt an Ounce of Flegm, then four Ounces of Spirits ſharp and acid, and gives Tincture to the Decoction of Roſes like Spirit of Vitriol. I have ſometimes obſerved this ſharp Spirit cryſtalize to the Glaſs Sides, when it has been long kept, and loſing its Acidity, becomes like the Flegm. Now he comes to Doctor *Foot*'s Queries; and delivers only Facts, referring Speculations to better Heads.

1. I diſtilled the Spaw Water in a glaſs Still ſtrongly luted to its Receiver, that no Spirit could eſcape me, and it yielded nothing but an inſipid Water, and I expect no other from any of the mineral Springs.

2. This

Argument and fallen into down right Raillery and Porter's Language of the loweſt Kind. If we reflect impartially upon the whole, it muſt be

2. This Spaw and all ſuch as are impregnated with Minerals, whether they be let ſtand or conveyed at a Diſtance, let fall in Time a yellowiſh Sediment; but it is not ſo in *Knareſborough* ſweet Spaw, nor ſuch others as have no Minerals, which have only imbibed the Vapour or Odour of Minerals. 3. When ſuch Waters are moved by Carriage, they ſooner precipitate that yellow Sediment to the Bottom, and eſpecially if conveyed in Oak Veſſels. 4. His yellow Sediment is plainly diſcernable, both in their Spring Heads and Streams; even *Knareſborough* Water colours the Ciſtern in Time, altho' it has little of the Subſtance. 5. Thoſe Bottles that are ſtopt cloſe, whether they be moved or not, will keep their briſk Reliſh longer than ſuch as are left open, and alſo longer retain their medicinal Virtues, together with their Colour and Sediment. 6. He found not any Difference in the Veſſels wherein *Scarborough* Water was put, *viz.* a Glaſs Bottle, or Ox Bladder, only that in the Bladder would not receive ſo black a Tincture from the Gall, as the other, but rather a Claret. 7. Neither himſelf, nor any he had met with could deviſe to prevent the Loſs of the *De-obſtruent* Virtue of this Water, nor hinder the Precipitation of the yellow Sediment, if removed at a Diſtance. 8. Notwithſtanding this Water lets fall the Ocre, yet it remains Purgative from the other mineral Salts and Spirits, which yet it retains even till and when it ſtinks, and perhaps being fetid it may purge the more, as thoſe who have drank it then have informed us, and *Knaresborough* Spaw will be enervated when no Ocre falls to the Bottom. 9. *Knareſborough* Waters and ſuch like are better explicated to have loſt their Virtues, by the flying off of ſpirituous Parts, ſince they have nothing elſe wherein their Virtue can conſiſt; whereas it will not ſerve for *Scarborough*, from which theſe Spirits cannot in Reaſon be excluded: Nay they are found more eminently in the Minerals, and therefore muſt be allowed to it, and ſuch like, an inteſtine Alteration and Precipitation of Parts, or ſome ſuch Expreſſion, which he refers to the Conſideration of the Learned. Next come we to the three chimical Maxims quoted by Doctor *Foot*, *viz.* that great medical Virtues conſiſt in the volatile Sulphurs of Metals and Minerals; but we would not have their fixt Parts excluded from their Uſe in Phyſick. 2. That Acids and Alcalies act upon one another, and their former Activities, and become a *tertium quid*. *Anſwer*; True, we ſee it made good in our preſent Waters; for they are quite another thing when they are in their Principles, agreeing with them in ſome things, and differing in others, as we ſaid before p. 18, 19, 61, 62. of our Book. 3. This laſt I acknowledge. As to Doctor *Highmore*, I thank him for his Candour, even tho' a Stranger to the Water, and cannot think himſelf a fit Arbitrator betwixt us, but ſuppoſes that ſome of the mineral Principles may be left out. I think I have demonſtrated the Exiſtence of all his five Principles in this Spaw againſt *Simpſon*, who yet after all his ſtrong Denials, aſſents tacitly to the whole of them. I take it kindly of Doctor *Highmore* or any other ingenious Gentleman who deſires Satisfaction, not quarrelling, to aſk what Queſtions he pleaſes; but I think I have convinced them all of the Truth of my Aſſertion from the ſundry Extracts ſent up to the Royal Society. Doctor *Highmore* wonders that I fetch in Alum which dries, aſtringes and thickens, and therefore cannot ſee how this Water can be ſo great an Aperient, and ſo uſeful in Hippo and Cachexy. This inadvertency is either owing to the Doctor's ſuperficial reading my Book, or to a bad Memory; for that this Water has much Alum is plain, even ſo much that *Simpſon* will ſcarce allow it any other Impregnation. And as to Alums being ſo great an Aſtringent, ſo as it can neither open Obſtructions nor looſen the Belly, that is true; and the Objection I have anſwered

be allowed that none of them were proper and impartial Judges. For 1. Doctor *Wittie* could never make good his Aſſertion by fair Experiment

to *Simpſon*, but I have at the ſame Time proved that all the reſt are there as well as Alum, and treated of them and their Properties communicated to the Water in my firſt Book of *Scarborough* Spaw. There I have touched on the Virtues of Vitriol, Iron, Nitre, Salt and Alum; where we have explained both how it cannot, and how it can open Obſtructions, and alſo purge without cauſing a Dyſentery. Galls tinging the Waters proceeds from Vitriol, for neither crude nor calcined Alum will do it; nor will any other of the Principles tincture the Water, only in one Place of the Cliffe near the Spaw, where there is a little Alum-ſtone laid with the vitrioline Juice; the ſame will the Earth in that Spot do, being impregnated with Vitriol, but all the other Alum Earth will never tinge the leaſt with the Gall. Doctor *Highmore* alſo wonders why I make Iron and Vitriol two diſtinct Principles, calling it *ferrum Vitriolatum:* This I ſaid before was to diſtinguiſh it from Vitriol of Copper which is emetic. And in my Anſwer to *Simpſon*, I have clearly proved them not to be the ſame thing. However ſince nothing will pleaſe theſe Gentlemen but Vitriol and Iron muſt be the ſame Thing: So Doctor *Jordan* doubts whether Alum or Vitriol are diſtinct, by which reckoning I might have confounded three of my Principles and ſaved my ſelf much Trouble. Doctor *Highmore*, will have it that I ſaid, the Vitriol which is found alone upon the Cliff will by the Summer's Heat become Iron; but the Doctor has certainly overlookt the Place, for I ſay that ſome of that which is like ordinary Earth, falling down turns to Iron Stone, and is fuſible in the Fire. The Doctor is poſitive about the Colour of *Roman* Vitriol which I ſay is factitious; in this Authors differ very much; and I have good Authority that the *Romans* add that Colour to it, when they caſt it into Forms. Doctor *Highmore* will have it, that we aſſert the Brackiſhneſs of the Sea to be from the Sun's Heat, and not foſſile Salts; but we deny both, and ſay it is connatural being ſo made, and ſo continuing, *&c.*

Doctor *Simpſon* alſo in his Hydrological Eſſays, anſwers Doctor *Foot*'s Queries concerning the Cauſe of the ſudden Loſs of the Virtues of mineral Waters. Thus 1. They never upon Diſtillation yield vinous, acid, or other Spirit, nor *Knaresborough* Sulphur Well. 2. That upon long Keeping or Carriage they do let fall a Sediment: For *Scarborough*, in forty eight Hours let fall its Sediment, and would not tincture with Galls. Another Bottle of it well cork'd and ſet by the like Time, then opened, did with Galls ſtrike Purple, but loſt that Property in twenty two Hours after. He ſealed up the Bottle Hermetically, let it ſtand ſix Weeks, it weighed the ſame as at firſt, had let fall no Ocre, and tinctured with Galls. 3. If they are cloſe ſtopt, let ſtand unmoved, they let not fall their Ocre ſo ſoon, nor loſe their tincturing Property. 4. They let fall their Ocre chiefly in the ſpring Head, then in the Streams, but none before they come at the Day. The 5th Query is anſwered already, and alſo the 6th. 7. How to prevent the Precipitation of their Sediment, that's done by hermetical Seal. 8. When Waters depoſite their Sediment they loſe both their tinging and purging Qualities. 9. Whether the *Phænomenon* of Loſs of Virtues is better explained by Precipitation of Sediment, or loſs of Spirit, and it is ſooner and ſurer reſolved by the firſt, for the ſecond they have not nor never had, for all Doctor *Witty* is ſo confident to the contrary, from which I draw theſe Corollaries. 1. That mineral Waters operate and give their *Phænomena*, by a due cotemperature of their mineral Ingredients. 2. That if mineral Waters precipitate ment and Demonſtration. 2. He was prejudiced in Favour of the Place, from the Advantages reaped by the Spaw. 3. His Antagoniſts having particular Views to ſerve, beſides Diſcovery of Truth, and Love to Mankind, he was prejudiced againſt them. 4. Doctor *Simpſon*'s chief Aim was to diſgrace Doctor *Witty*, lay him aſide and make room for himſelf. 5. Doctor *Tonſtal* had for two or three Seaſons, attempted to monopolize the Buſineſs of the Place, but being diſappointed becomes Peeviſh, vilifies the Water, and ſets up *Harrigate* in Oppoſition to it; nor could ſo ſimple and cool a Method down with Doctor *Simpſon*, who was all for the Paracelſian Practice, hot Regimen, and Ternary of Medicines. 7. Doctor *Liſter* was too much attached to his Hypotheſes, too remiſs in his Examination, ſcanty in his Ex-

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pitate their Ocre they loſe both tinging and purging Qualities. 3. So long as they precipitate not, ſo long they retain their Virtues. 4. To cauſe theſe Waters to precipitate, Motion, Heat, or Air is required. 5. Thus being preſerved from theſe three, they retain their Virtue, Weight, &c. for Years. 6. Having Recourſe to mineral Spirits for theſe Things ſolvable by Alteration and Precipitation, is impoſing upon our Imaginations, by a Kind of cuſtomary Faſcination.

Now come we to Doctor *Simpſon*'s Reflexions on *Tonſtal*, *Scarborough* Spaw anatomized; and 1. He cannot agree with him that what he will have Alum Glebe, is truly Minera of Iron encloſed in the firſt; and to ſay that the Tincture of this Water with Galls, is from unburnt Alum-Stone, becauſe the vitrioline Spirit and Iron are too great Friends to be ſo eaſily parted by Precipitation, is a Jeſt. Does not Solution of *Sal Martis*, or Copperas the ſame, eſpecially by Air, Heat and Motion. Again ſays Doctor *Tonſtal* all vitrioline Water turn the Drinkers *fæces* black, but this blue; but I ſay is not blue, a remiſs Degree of black? Next from the Proportions of the fixt Parts of the Spaw. Doctor *Tonſtal* will have it to be a petrefying Water, therefore bad in an Aſthma, Jaundice, Gout, Stone, &c. But to prevent any Harm this Way, take theſe Rules, firſt give a vitrioline Vomit, then drink pretty freely two or three Mornings of the Water, uſe gentle Exerciſe, and drink a Glaſs or two of white Wine two Hours after the Water, then eat a Diſh of Broath, dine on few Diſhes of Meat; after this give a Doſe of Pills overnight, after which reſt a Day or two from drinking, then vomit drink and purge, as before. So not only Danger will be prevented, but great Benefit reaped. The reſt of this Tract is ſpent on the Diſpute whether Alum be acid or alcaline, and therefore we paſs it by.

There is nothing in *Allen*'s natural Hiſtory on this Water worth tranſcribing hither, only he ſays, its Salt precipitates not Solution of Silver, it ſtrikes Purple with Galls. After three Days ſtanding in an open Veſſel, tho' ſomewhat remiſſer, the Water upon Stagnation is covered with an azure coloured bituminous Scum; or if it ſtand a Week, one riſes on it like that on Lime Water. Four Gallons of the Water afford one Ounce of Salt, and an Ounce of ſtone Powder; the firſt is very bitter, and when freſh made has a ſulphureous ſmell. A Solution of it turned *Sal Saturni* white as Milk, and curdles Salt of Tartar, flames not on a hot Iron being wholly nitrous, like that in the Earth.

Thus we have ſeen what others have ſaid on this famous Spaw, *jam ad Pyxides noſtras.*

periments, and haſty in his Concluſions; overlooks ſome Things, and takes others for granted. But,

I ſay both the purging and chalybeate Spaws (the laſt is alſo purgative, but requires a larger Doſe, and is ſlower in Operation by Stool, tho' a briſker Diuretick) riſes up out of the Sands within the Sea Mark, at the Foot of the Cliff, whoſe ſummit is above a hundred Yards perpendicular. This Cliff conſiſts chiefly of Clay, Gravel and Stone, till it come within ſix or ſeven Yards of a Level with the Sands, then we have a *Congeries* of Alum-ſtone, Iron-ſtone, Clay, a kind of *Lapis Calcarius*, ſeveral Petrefactions of Ocre, Sulphur, Nitre, *&c.* I took up ſome Alum-ſtone that had not been expoſed to the Air on the Face of the Cliff; this I powdered, and made ſeveral Experiments with it, but diſcovered not the leaſt of any of its Parts, thus diſſolvable in Water, ſo as to produce any viſible *Phænomena* by Colorations. Neither Tincture nor powder of Galls changed the ſtrongeſt Infuſion I could prepare of it, either with hot Water or cold. Then I burnt a piece of this Stone half an Hour in an open Fire, powdered and infuſed it in common Water; it ſent forth a moſt intolerable ſtrong ſulphureous Smell, the very ſame with *Harrigate* ſulphur Water. This Infuſion when cleared and filtred, I poured off into ſundry Glaſſes; Solutions of Silver, Sugar of Lead, Sublimate, or any metalic Body diſſolved in *Aqua fortis* or plain Water, made it preſently jet black and thick, it ſoon curdled, and let fall a black Sediment, which dried gently before the Fire, and laid on a red hot Iron in a cloſe dark Room, it ſmoaked, burnt with a blue Flame, and ſtunk inſufferably. The Water poured off the Sediment ſtunk alſo. Then I dried the black Sludge that laid upon the Bottom of the Infuſion, put it in a red hot Fire-Shovel, in a dark Room, it ſtunk worſe than all the reſt, and burnt with a rapid blue Flame. I tried another Piece the ſame Way, but none of the Solutions turned its Infuſion black, nor did it ſtink ſo ſtrong. Theſe Experiments were made in very cold Weather in *October*, 1731.

I digged alſo a little Way into the Cliff, and took out a Piece of freſh Iron-ſtone, one Part whereof I powdered and infuſed in common Water, the other I burnt ſlightly in an open Fire, then powdered and infuſed in warm Water; when the firſt Infuſion had ſtood till it was clear and filtred, I poured it out into ſeveral Glaſſes, but neither Tinctures nor Powders of Galls, Sumac, green Tea, red Roſes, nor Oak Leaves, turned it red, blue or purple. The filtred Infuſion of the ſecond put into ſeveral Glaſſes, and the above Tinctures put to them, they altered not the Water at firſt, but after they had ſtood three or four Hours, they all turned of a pale Purple. I took a Piece of the hard Clay of the Cliff, and another Piece of that hard baked Clay within the Sea Mark, which Doctor *Wittie* calls Iron, powdered both and infuſed in Water, let it ſtand till they were clear, then filtred them, poured out the Infuſion into ſeveral Glaſſes, and dropped in Tinctures of Galls, green Tea, Sumac, *&c.* into them, but no purple Colour or Tendency to it enſued.

July, 28, 1732. I took ſeveral Pieces of Alum-ſtone, and Iron-ſtone out of the Cliff, burnt them with ſeveral Degrees of Calcination, in an open Fire, then powdered and infuſed them in Water, the filtred Liquors I put out into ſundry Glaſſes, as before, but the Infuſion of Alum-ſtone turned not the mineral Solutions black, tho' they were of a darkiſh Colour and ſtunk, nor did they precipitate, as before, nor did the Infuſion of Iron-ſtone ſtrike Purple with Galls, *&c.*

I took ſome of the Salt that ſweats out of the Cliff, diſſolved it in Water, till its Earth ſubſided, then filtred it, and poured it out into ſeveral Glaſſes, with Tincture of Nephritic-wood it became green; with Tincture of Rhubarb, a light reddiſh yellow; with Tincture of Galls, Sumac, and green Tea, a muddy white, which afterwards turned green.

I took one Stone like a Knife Sheath, and one of the Petrefactions like a Boy's Top, tipped with two large bright braſs Nails, one above and the other below, (which are frequently to be met with there) burnt them in an open Fire, and powdered them ſeparately, and then infuſed them all Night in two Pots in clear Water, next Morning I poured off the Water and filtred it, the firſt taſted the ſam as the Water that has been long uſed in a Blackſmith's Trough; but certainly none beſide the Taſters can poſſibly imagine the ſtrange Combination of nauſeous Taſtes in the ſecond: Had I not been well aſſured of the Non-exiſtence of the Arſenic in Water, or its Petrefaction therefrom, I had certainly believed I was poyſoned, for an Hour or two after. So intolerably ſtrong were the Taſtes of Sulphur, Iron-ſtone, Quick-lime, but above all of ſtinking Fiſh. Some drops of the Solution of Quickſilver made the firſt a greeniſh yellow, the ſecond of a reddiſh yellow Solution of Sublimate affected neither. Solution of Sugar of Lead made the firſt of a muddy white, like clay Water, the ſecond of a deep dark brown Both of them with Spirits of Vitriol let fall a yellow Sediment. Spirits of Hartſhorn turned both white and muddy. Syrup of Violets changed the firſt to a light green, the other to a yellow. Infuſion of red Sanders turned the firſt Red like calcined Iron-ſtone, the laſt was yellow between the Eye and Light, but blue ſide-way of the Light. Tincture of *Braſil* Wood made the firſt of a fine Peas Bloom, the ſecond of a reddiſh brown. Tincture of Logwood ſtruck the firſt blue, which ſeparated much Sediment, and left a clear Liquor above, the ſecond was of a deep blood red. Tincture of Galls altered the firſt to a fine Violet or Mazarine blue, the other to a light red. Green Tea, Tincture of Sumac, red Roſes, *&c.* all turned the firſt of an opac or blackiſh blue, the laſt was a muddy clear.

November, 27, 1731. I took the Powder of the cover of a calcined Snake-ſtone, and of the Snake-ſtone it ſelf, Powder of the Boy's Top, and Powder of the Inſide of the Boy's Top all burnt in an open Fire, on each of theſe I poured three Gills of Water, let them ſtand four Hours, then filtred the ſeparate Infuſion and poured them out into ſundry rows of Glaſſes; upon Trial of them, the *Phœnomena* were inexpreſſibly quick and beautiful, changing inſtantly from one Colour to another; the firſt, third, and fourth brightened Solution of Gold, but the ſecond was red with it. Solution of Silver turned the firſt and ſecond of a blueiſh white, the third of a pale yellow, the fourth of a light blue. Solution of Copper changed the firſt and ſecond a muddy blue, the fourth to a clear blue, the third to a pale green. Tincture of Nephritic Wood turned the firſt and fourth to a graſs Green, at firſt touch, and thick, the ſecond and third were whitiſh at firſt, then of a faint pale Green. Solution of Tin made the firſt and third of a deep yellow, the ſecond blood red, the fourth yellowiſh brown. Tincture of Rhubarb turned the firſt, ſecond and fourth of a deep blood red, the third of a pale reddiſh Colour. Solution of Sublimate changed the firſt to red, the ſecond to a yellow exactly like beaten yelks of Eggs, the third reddiſh, the fourth white, which quickly changed, curdled, and let fall a deep brown Powder. Solution of Sugar of Lead made the fourth of a fine light white, the firſt to a paler white, the third paler, the ſecond of a reddiſh brown. Oil of Tartar turned the firſt and fourth a clear Pearl, the ſecond darker, the third a dark reddiſh. Spirit of Vitriol altered not the firſt ſecond and fourth, but the third became reddiſh. Spirit of Hartſhorn had the ſame Effect as Oil of Tartar, and Spirit of Salt the ſame as Spirit of Vitriol. Syrup of Violets turned the ſecond and fourth a pale Green, the firſt green and the fourth a deep graſs Green. Tincture of Braſil made them all reddiſh. Tincture of Logwood changed them all to an opac deep blood Red. Tincture of Galls at firſt touch, turned the firſt white as

Milk, but it preſently became green, the ſecond was ſoon reddiſh, the third a very pale red, the fourth a deep blue, which inſtantly was of a deep green. When theſe four Rows of Glaſſes had ſtood twenty four Hours longer, theſe with Tincture of Nephritic Wood had all let fall a large deep green Sediment. The firſt ſecond and fourth with Tincture of Rhubarb were of a light red and precipitated very much. The ſecond with Oil of Tartar was full of ſolid white Flakes. Theſe with the acid Spirits retained their clearneſs. Theſe with Braſil were much paler. The firſt and ſecond of theſe with Logwood had a very fine clear Liquor above, and a very large deep red Precipitation at Bottom, the ſecond a yellowiſh Liquor, with a blackiſh red Precipitation, the fourth was clear with a pale red Precipitation. The firſt of theſe with Galls was now of a deep blue the firſt half Inch below the Surface, the reſt of a muddy white, the Liquor of the ſecond was clear with a leaden coloured Sediment; the red Colour of the third was quite loſt. The fourth was clear above and had a very large green Precipitation. Green Tea had then turned the firſt of a pale red, the reſt yellowiſh. From the Infuſion of the Boy's Top, which I had reſerved from theſe Experiments, I obtained a fine fixt nitrous Salt.

From the Examination of thoſe Foſſils through which this Water is ſtrained, and by which we ſuppoſe it is impregnated, we come to try the Spring it ſelf. *October* 6, 1731. being very cold Weather, I took of both purging and chalybeate Waters at Night, filled a Bottle with each, then half filled two other Bottles of each, and laſtly ſet ſome in two braſs Pans in the Room, let all ſix ſtand uncorked and uncovered all Night, in a Room wherein was a good Fire. Yet after ten Hours ſtanding they all ſtruck a pretty good purple with Galls, tho' the purging Water was fainteſt, and that in the Pan paleſt of all; nor were they any heavier next Morning than when firſt brought into the Inn, both being then heavier than at the Well. I put a Quantity of both in two Pans, to exhale upon the ſame Fire at the ſame Time, but the purging Water loſt its tincturing Property with Galls about the End of the ſecond Degree of Heat, the chalybeate ſtruck purple till it began to boil.

July 28, 1732. I compared in the Hydroſtatic Balance the different Weights of Sea Water, Spaw, chalybeate and common Water. The firſt weighed one hundred twenty Grains in a Pint heavier than common Water, at high Water, and a very rough Sea. The Spaw at the Spring was thirty one Grains in a Pint heavier than common Water. The chalybeate there was twelve Grains heavier than common Water, the Spaw Water carried up to the Town was forty eight Grains in a Pint heavier, that is, ſeventeen Grains heavier than at the Spring. But the chalybeate was eighteen Grains in a Pint heavier at the Town. The Spaw and chalybeate both taken up at once, carried to the Town, and let ſtand two Hours, then tried with Tincture of Galls, their Colour (which with Galls is naturally of a whitiſh light Pink) was much fainter and weaker; when the Remainder of theſe Waters had ſtood all Night in open Bottles, and tried with Galls next Day at noon, the firſt tinged none at all, but in twenty four Hours was green throughout, the other tinged a weak purple juſt viſible.

Solution of Silver changed both purging and chalybeate Waters of a pearl white, tho' both quickly precipitated the Silver white, to the Bottom of the Glaſs, both of them brightened the Solution of Gold, but the firſt moſt. Solution of Copper changed both to a Sky blue. Tincture of Nephritic Wood firſt white then blue and laſtly green. Tincture of Rhubarb changed both yellow, only the firſt was a browniſh yellow, the laſt a dark and reddiſh yellow. Both were of a pearl Colour, and had variegated Pellicles, after ſtanding mixt twenty four Hours with Solution of Sublimate. Solution of Sugar of Lead gave a milk white Colour to both at firſt, but they preſently precipitated much white Powder. Oil of Tartar made both of a pale white, with a large Sediment of the ſame Colour, tho' the purging Water had moſt with a reddiſh brown caſt. Spirits of *Sal Armoniac* and Hartſhorn change both Springs whitiſh, the firſt more cruddled, and had a larger Sediment, with a red Cloud directly croſs the Middle of the Glaſs. The Chalybeate was of a paler white more mucilaginous, leſs Precipitation, no red, but a little greeniſh. Spirits of Vitriol, Salt, and Sulphur, on mixing, raiſed a very briſk Ebullition in the Waters, without any farther Effect. Syrup of Cloves turned the firſt to a deep green, but the laſt to a lighter green; ſyrup of Violets changed both to a bluiſh at firſt, but after ſtanding twenty four Hours, they were green throughout, both were yellow with Tincture of Fuſtic, and reddiſh with Tincture of Braſil, but the laſt was reddeſt. The Chalybeate with Tincture of Logwood was blue, the purging Water a browniſh red. Galls turned the firſt of a light red purple, or whitiſh Pink, the laſt of a deeper purple. Tincture of Sumac turned the firſt of a Pink alſo, the laſt was deeper coloured. Pleaſe to take Notice once for all, that in the Examination of this and all the reſt of theſe Waters, 1. All the Tinctures uſed were drawn in Water except that of Nephritic Wood, and Rhubarb. 2. That the conſtant Number of Drops to each Glaſs of Water was ten, from the ſame ſmall vial Bottles, which I kept on Purpoſe; tho' drops often differ from the Size of the bottle Mouth, as well as the Fullneſs of the Bottle. 3. All the Tinctures of Galls were made from blue freſh Galls. The Galls, Log-wood and Nephritic-wood were the ſame in them all, having laid in a Stock to anſwer, before my ſetting out; the Glaſſes uſed were only Wine or Gelly Glaſſes, which riſe from a large Baſis to a Cone inverted. 4. A clean braſs Pan was what I conſtantly uſed for Exhalation, over a clear Fire, in a clean Chimney. 5. I always took care that the Fire was not too ſtrong.

November 4. I got a Bottle of *Scarborough* Water not half corked, and never ſealed, which had been kept three Months, and ſtunk moſt intolerably; ten Drops of Solution of Silver dropped into a Glaſs of it, became inſtantly of an exceeding deep ſhining black, fermented much, cruddled and let fall its Sulphur, in a black thick Skin on the Sides and Bottom of the Glaſs, and the Water ſtunk nevertheleſs, and was in all Things the ſame with *Harrigate* Sulphur Water, only it precipitated not the Silver ſo inſtantly. Ten Drops of Tincture of Nephritic-wood put to another Glaſs of it, made it of a dark muddy white on mixing, then greeniſh white, next it cruddled and let fall its Sediment, which together with the Scum at the top, were of a deep green Colour. Ten Drops of Tincture of Rhubarb put to a third Glaſs of it, was of a reddiſh yellow. Solution of Sublimate turned another Glaſs of a deep Black, which ſeparated and let fall a Sediment two thirds of an Inch high, the Liquor clear, and a blue Scum. Addition of ten Drops of Solution of Sugar of Lead had the ſame Effect on another Glaſs. Oil of Tartar in a Glaſs threw down a white looſe Sediment three fourths of an Inch high; the ſame did Spirits of Hartſhorn. The acid Spirits turned it of a bluiſh clear. Syrup of Violets and tincture of red Sanders changed it white. Tincture of Brazil-wood of a deep red with a whitiſh Caſt. Tincture of Log-wood changed it of a dark brown. Tincture of Galls of a pale white, which ſoon became green throughout, Sumac and green Tea did the ſame; both the Vitriols turned it black. It was pleaſant enough next Day to ſee how the clear Water, black Sulphur, and brown Ocre were all parted in the Glaſs that had Solution of Sublimate, and Vitriol of Steel in them. I poured off the clear Liquor from thoſe Glaſſes with Galls and ſublimate, after they had ſtood five Days and Nights, mixing them undeſignedly, they preſently ſtruck a deep purple. Then I poured off the clear from thoſe Glaſſes which had let fall a jet black Sediment, put the laſt into a Tea Cup, exhaled the remaining Humidity before the Fire, it ſmell'd ſtrong of Sulphur all the while it was drying. The dried Powder from half a Pint of Water weighed three Grains, two whereof I threw upon a red hot Iron, it filled the Room with a ſtrong Smell of Sulphur, ſent forth a blue Smoak, then a Flame. The other Grain put into common Water wherein were ten Drops of Solution of Silver, did not become black, as before, for the Sediment did not diſſolve.

A Pint and a half of *Scarborough* Water become fetid, (by ſtanding nine Weeks) I poured it upon two Drams of Solution of Sublimate, it inſtantly was jet black and thick, but after ſtanding three Hours it let fall about three Tea Spoonfuls of a black Sludge, and the Water became clear. This Sediment dried to a dark brown Powder, weighed ten Grains; this laid on a hot plate of Iron, burnt red with a ſtrong Smell of Sulphur, but no Flame, there remained four Grains and a half of white Calx, which was the Sublimate that had been diſſolved, with a little Earth. I poured a Pint of this fetid Water upon two Drams of Solution of Sugar of Lead, let it ſtand till it let fall its Sediment, then poured off the clear, tried it in ſeveral Glaſſes. With Tincture of Nephritic-wood it was a dark muddy white, next Day of a pale yellow. With Tincture of Rhubarb it was pale yellow, next Day a deep yellowiſh brown. With Solution of Sublimate it was a fine bluiſh clear, next Day it had a Scum of various Colours. With Sugar of Lead it was of a leaden Colour, the ſame it was with Oil of Tartar and Spirit of Hartſhorn. Syrup of Violets made it a bluiſh Clear, next Day it was green. With Log-wood it was a deep yellowiſh brown, next Day a pale red with a ſmall Sediment. With Galls clear and a little darkiſh.

Two quarts of the purging Water taken up in *December*, and exhaled left of fine white Sediment ſix Penny Weight or ſix Grains. Two Quarts of it taken up in *July* and exhaled, left of white Sediment ſeven Penny Weight and five Grains. Two Quarts of it taken up and exhaled in *September*, left ſeven Penny Weight, and twenty one Grains. So that the firſt is the leaſt, and laſt the largeſt Quantity of Sediment I ever obſerved in this Water. In *July*, when three Pints of the purging Water afforded five Penny Weight and near a half, the like Quantity of the chalybeate Water left three Penny Weight and twenty Grains. Both theſe Sediments fermented ſtrongly with Spirits or Oil of Vitriol, Salt, or Sulphur, with Juice of Lemon.

Lemon or ſtrong Vinegar; but not with Spirit of Hartſhorn, *Sal Armoniac*, or *Sal volatile Oleoſum*. They ſeemed to burn black, and ſwell on a red hot Iron, and crackled a little. Six Scruples and a half of the firſt Sediment afforded four Scruples and a half of Salt, and two Scruples of Earth. Four Scruples and four Grains of the laſt yielded fifty four Grains of Salt, and thirty Grains of Earth. The Salts ſeparated from the Earth fermented no more with the ſtrongeſt Acids, than the laſt did alone in the open Air, the Earths fermented violently, ſmoaking, ſwelling, bubbling and huffing. This Salt laid upon a hot Iron, melted a little, ſwell'd, blebbed and burnt to a Calx. The reſt of the Salts diſſolved and ſet by to cryſtalize projected cryſtals, Nitre chiefly. Thoſe of the Chalybeate were the ſame but larger: The Earth calcined, the Load-ſtone attracted a very ſmall Part of it very briſkly; but the Sediment precipitated by Galls in the freſh Water, dried and calcined, was vigorouſly attracted by the Load-ſtone. The Calcination of thoſe Earths is to no Purpoſe, except it be done in a Furnace that will quickly melt down Iron, a leſſer Heat is too remiſs, and will not fit the Iron in them for the magnetic Experiment. The Earth that the Load-ſtone acts not upon, is white, gritty, and hard, exceedingly Alcaline. The Spaw ſends out about one hundred and twenty Gallons of Water in an Hour, in *March*, when all Springs are generally fulleſt and higheſt, but not quite ſo much in Summer. Which Quantity of Water then contains four Pound eleven Ounces of Sediment, about three Pound two Ounces thereof is Salt, and one Pound nine Ounces Earth. But in Summers Drought we muſt ſubſtract a fourth Part Water and add a fourth Part more Sediment, and then this Quantity of Water contains five Pound fourteen Ounces of Sediment; or three Pound fourteen Ounces and two thirds of an Ounce of Salt, and one Pound fifteen Ounces of Earth.

From the whole we draw theſe Concluſions. 1. From the great Contention about theſe Waters, learn we how much need the Naturaliſt has to be upon his Guard, that he put not himſelf upon all this Trouble for the Support of ſome darling Opinion, Intereſt, or the Gratification of ſome Humour or Prejudice; and to take Care that he draw not falſe Concluſions from true Principles, nor make raſh Inferences from falſe Principles, but attend diligently and impartially, with a ſincere honeſt Mind, ready to receive Inſtruction. 2. As natural Truths may be, and often are ſearched out and diſcovered by an indefatigable Purſuit of rational Methods, and as Nature ſeldom eludes or diſappoints ſuch Attempts and Endeavours of her ſincere Admirers and Inveſtigators, ſo ſhe as rarely makes thoſe charming and uſeful Diſcoveries of theſe Truths by ſuch as purſue them by improper Means, or to wrong Ends. 3. Since the upper Part of this Cliff which conſiſts of Clay, Gravel and Stone, affords only ſome Ouzings of common Water, and the Bottom of the ſame Cliff through which our Spaw is ſtrained, not only contains, but chiefly conſiſts of a Heap of mineral Subſtances, therefore it is theſe Subſtances that impregnate this Spaw, ſince Springs filtred through common Earth only, do not impregnate Waters with medicinal Qualities. 4. Tho' this Spaw is ſtrained through and impregnated by theſe mineral Bodies, yet it partakes not of all, but only ſome of them. For from the Experiments on the uncalcined Alum-ſtone, we ſee it communicates none of its Salts to the Water, nor is any of its Salt viſibly diſſolved or to be traced in the Water, when taken out of the Cliff from the other Minerals. 5. From our Trials on the calcined Alum-Stone we draw theſe Inferences. 1. That Fire diſpoſes its Principles for Separation by Water. 2. Since the Infuſion of half burnt Alum-ſtone gives a moſt ſulphureous Smell, and a Solution of Silver changes it black, and precipitates a black inflammable Subſtance, and alſo the dried Powder that had been infuſed, ſmoaks, ſtinks and burns blue on a red hot Iron, we ſay it contains Sulphur. 3. But ſome of this Sulphur being precipitated in the Water, ſome ſtill mixt with it after the metalic Solutions were added, and another Part laid in the Powder and was never mixt with the Water, we ſay that either ſome Parts of this Sulphur are more ſeparable and diſſolvable than others, or ſome Part of it is ſeparable by a leſſer Degree of Heat and Fire than the reſt. 4. Since the burnt Stone communicates a Styptic diſſolvable inviſible Subſtance to the Water, which has a ſtyptic ſweetiſh aſtringent Taſte, paſſes the filtering Cape, and cryſtalizes in a moiſt Place, we ſay it contains a Salt. 5. But a great Part of the Stone being neither diſſolvable in Water, nor conſumable by Fire, we call this Part Earth. 6. Therefore we find three ſeparable Principles in this Stone, *viz.* Salt, Sulphur, and Earth. 7. Tho' the Salt and Earth are ſeparable by Water after Calcination, yet they are inſeparably united before, from ſome third Principle that is as a *Vinculum* or Cement; but the Fire deſtroying the Sulphur, and then the other being readily ſeparable, it is plain that the Sulphur was this Cement. Therefore to ſeparate the Salt and Earth, it is neceſſary that the Sulphur is firſt deſtroyed. But in a natural State Sulphur exiſting in great Quantity in this Stone, the Water cannot poſſibly diſſolve or carry off any of its Salt; or be therewith impregnated,

pregnated, therefore there is no Alum in our Spaw. 8. It will not, nor ſhould not, be hence concluded, that there are no mineral Waters impregnated with Alum, becauſe I have not met with any of them; for there may poſſibly be ſome ſuch Mountains of Alum-ſtone as contain but little Sulphur, or not ſufficient to render the Salt inſeparable from the Earth, and indiſſolvable in Water.

6. From the Experiments on the burnt and unburnt Iron-ſtone, we find that the conſtituent Parts of the firſt are not inſtantaneouſly ſeparable in Water in a ſtate of reſt, without any other Mixture. But 2. Since the Infuſion of the ſecond gives a purple Colour with Aſtringents, we know the Fire has ſeparated the Compages of its conſtituent Principles. 3. But Aſtringents giving this Infuſion a purple Colour, and this being peculiar to Vitriol only, we ſay that the Salt of this Stone is Vitriol. 4. Both Salt and Earth remaining after Calcination, and yielding to Separation then and not before, we ſay that here alſo is a Sulphur which united the other two before. 5. Hereby we ſee that the Compoſitum of Ironſtone is Earth, Vitriol, and Sulphur. 7. Since neither the Infuſion of the Clay of the Cliff, nor that fallen down on the Sands, ſtruck Purple with Aſtringents, we conclude it to be neither Iron, Iron-ſtone, nor contains any perceptible Vitriol. Nor can we poſſibly allow ſuch a Permutation of natural Salts, that marine Salt ſoaked in by this Clay, ſhould ever become Vitriol, or Iron, tho' we readily acknowledge, that ſome ſmall looſe petrefactions wherein is Iron-ſtone or Vitriol, may be ſometimes mixt with this Clay, and if an Infuſion of this ſhould turn purple with Aſtringents, yet give us leave to ſay, that it is not the Clay, but the Petrefaction. 8. It is either not all calcined Iron-ſtone, or Alum-ſtone, that afford ſuch quantities of Vitriol and Sulphur, nor do theſe Principles exiſt in the ſame quantity in them at all Times and Seaſons, nor are they alike ſeparable and perceptible. 9. We ſee that the Salt which ſweats out of the Rock is neither Vitriol nor Alum, but Nitre, with which not only this Cliff, but all the Ground about the Town, is highly impregnated, and richly fertilated, hence moſt of their common Water abounds with Nitre. 10. From the Experiments on the Kniſeſheath, and one part of the Boy's Top, we ſee the firſt was only Iron-ſtone, the laſt a Maſs of Nitre, Sulphur, and calcarious Earth. 11. From the Trials on the Snake-ſtone and its Cover, the Inſide of the Boy's Top and its Cover, we learn, 1. That their Compoſitions differ little. 2. That the Cover of the Snake-ſtone conſiſted of Nitre, calcarious Earth, and a little Sulphur. 3. That the Snake-ſtone it ſelf

was chiefly Sulphur, ſome Ocre, and a little Nitre. 4. That the Cover of the Boy's Top was Earth, Nitre, and a little Vitriol; its Inſide much Sulphur, Vitriol, and Earth. 12. Since theſe and a great many other Petrefactions examined, were all found to conſiſt of calcarious or ocrous Earth, Nitre, Sulphur, and Vitriol, differently compounded. Then 1. They are only the Product of the Cliff wherein theſe Principles and Petrefactions abound; and not of the Sea, wherein is only common Salt, Water, Sand, Seaplants, *&c.* 2. Since there is no Alum in them, tho' there is abundance of Alum-ſtone in the Cliff, we imagine it is not a proper Ingredient for Petrefactions. 13. Since Sugar of Lead gives a Precipitation and Sediment in the filtred Infuſion of thoſe Petrefactions, then here there is ſome Earth mixed with, and imperceptibly lodged in the Pores of the Water, which is ſeparated by the Sugar of Lead. 14. Since theſe Spaw Waters weighed ſo much heavier at the Town than at the Spring, tho' no colder, yea warmer in the Summers heat, then they contain a more dilated Air, or a very ſubtile Mineral Spirit. 15. Since they weigh as heavy when inſtantly carried up to the Town, as they do a Day, a Month, or a Year after; then this plainly ſhews us the Volatility, and ſudden Loſs of this Spirit. 16. Since this Spirit is ſo quickly and irrecoverably gone in whatſoever Veſſel it is put, whether Glaſs, Wood, or Stone, corked or uncorked; it is plain that no Wax, Oil, or ſuch other Contrivances avail any thing toward bribing or commanding this Spirits continuance. 17. That this Mineral Spirit is no Fiction, but a Reality, we are further convinced, from the Waters ſparkling much when poured out freſh at the Spring-head into a Glaſs, from its intoxicating the Drinkers there more than common, or the ſame Water carried or kept a little, and finally from its ſitting much lighter on the Stomach, and going ſooner off the Body, freſh at the Spring than afterwards. 18. But the Chalybeate Water weighing ſtill heavier (in proportion to its Contents) at the Town, than the other, therefore it ſeems to be more richly impregnated with this Spirit. 19. Since Galls, Green-Tea, Oak-Leaves, Sumac, Red Roſes, *&c.* turn theſe Waters purple, therefore they contain Vitriol.

But here I am ſtopt by ſome whiſpering me in the Ear, that I run too faſt, and take diſputed things for granted; I know not but my Vitriol may prove Alum, and what then? I anſwer, 1. Vitriol and Nitre I find in, and can extract from the Petrefactions, but no Alum, and the

Water containing all the ſame Minerals with the Petrefaction (and marine Salt beſides;) I ſuppoſe therefore the Water has no Alum neither. 2. I have had ſeveral thoroughly calcined Alum-ſtones, whoſe infuſion would not ſtrike purple with Galls, and ſome of the ſame Stone laid by, in time, would put out many ſaline Efflorescences in the Air, which Efflorescences diſſolved in Water, the Solution gave not the leaſt purple Colour of any kind with Galls; and yet the Stone upon Infuſion afforded Salt enough. Now we know that both mature and immature Vitriols ſtrike purple with Galls, but here mature Alum which tinges not with Galls, and if true Alum will not ſtrike purple with Galls, no kind of it will, therefore our Spaw contains not Alum, but Vitriol. 3. There is very little Alum-ſtone without Iron-ſtone, or Marcaſites of Iron, theſe give a purple Colour with Galls when calcined, and Non-attendance to this has made them take it for Alum, when it was Vitriol; for when the *Lixivium* of Alum-ſtone is let off from its Calx, they let it ſtand in its Receiver till it lets fall a Sludge or Sediment, then they preſently let it off into another Receiver, where are the Alcaline Salts, for ſhould it ſtand longer upon this Sludge or Sediment (called by the Workmen Slame) it would cut out and conſume the Alum, now this Sediment is Vitriol. 4. Alum and Vitriol differ in their Taſte, the firſt is of a ſweetiſh rough aſtringent Taſte, the laſt of a harſh, rough irony Taſte; but our Spaw has the laſt when freſh, not the firſt; therefore it contains Vitriol not Alum. 5. When we procure this purple-colouring Salt from the Petrefactions, and cryſtalize it, it is Vitriol, but Alum Cryſtals are Octohedral, therefore ours is Vitriol not Alum. 6. The Cryſtals procured from the purple-colouring Salt in our Petrefactions, are diſſolvable in about ſeven or eight times their Weight of Water, but Alum Cryſtals in not leſs than fourteen times their Quantity. The Quantity of Water in which Salts are diſſolvable, is no bad Teſt of the Genus of natural Salt, Alum being diſſolvable in no leſs than fourteen times its own Quantity; Marine Salt in three times and one fourth its own Quantity, Nitre in ſix times one third its Quantity, *&c.* 7. Air, Water, or any of the Salts, corrode Iron, or Iron-ſtone, hence the Ocre in the Baſon and Stream of our Chalybeates, but not Alum-ſtone, therefore it is not diſſolved, and cannot impregnate Waters. 8. But ſuppoſing our Spaw were impregnated with

Alum, and had its tincturing Property from it, yet a Mixture of Alcalies would prevent its ſtriking purple with Galls; but though our Spaw has a hundred times the Quantity of Alcali that it has of Vitriol, yet whilſt freſh taken up, it ſtill ſtrikes purple, therefore it is Vitriol not Alum. 9. Our Spaw opens Obſtructions, cleanſes the Veſſels, and purges; but Alum purſes up the Bowels and Veſſels, clears not this laſt, but leaves the Mucus upon them, and contracts them, it alſo conſtringes the Belly; therefore the Salt of our Spaw is Nitre, and volatile Vitriol, not Alum [m].

20. But the Water ſitting light and eaſy on the Stomach, no Vomiting, Sickneſs, nor Pain of the Stomach or Bowels, or Twitchings attending its uſe, we ſay this is the Vitriol of Iron and not Copper. 21. The Spaw being a whiter Pink Colour with Galls, than the Chalybeate, therefore the firſt has more calca-

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[m] What gives ſome a ſtronger Suppoſition of Alum in this Spaw, may be from a Paper in [Numb. 104.] of the *Philoſophical Tranſactions*, giving the Affinity between natural Alum and Vitriol. That not only in *England*, but ſeveral other parts of the World, Vitriol is ordinarily found in the Vein, and ſometimes in the ſame Parcel that yields the Alum, and may by ſeveral Methods be ſeparated from each other. The Mineral of Alum (if mature) elixivated yields its Alum preſently; if leſs mature, it requires previous Calcination; if very immature, it muſt not only be burnt, but long expoſed to the Air, the Cauſe whereof is the very ſame, as that of the like Caſe in Vitriol. Alum like it being produced by the Sulphur acting on, corroding of, and coagulating ſome mineral Subſtance which uſually partakes more of a terrene and ſtony, than metallic Nature, altho' Metal is often found to be contained in the Alum-ſtone or Ore. And that the Sulphur is the chief efficient and material cauſe of its Production, appears from hence, that many Alum-ſtones, as the Vitriolate, diſtilled *per Deſcenſum*, yield good Brimſtone, and all Alum-ſtones or Ore, during Calcination, emit a Sulphureous Steam. A curious Naturaliſt gathered from the ſame Rock, within a few Inches of each other, Vitriol, Alum and Sulphur, all of them excellent and perfect in their kind. He ſays, that they are ſo nearly allied, that he has an Artifice whereby he can convert them into each other, which to all intents and purpoſes ſhall be the ſame with the Natural, theſe diſtilled into an acid Spirit with Copper or Iron, become good Vitriol, and Vitriol freed from its metalic Parts becomes Alum, and diſtilled yields a Spirit ſcarcely to be diſtinguiſhed not only by Taſte, but even by the niceſt and moſt accurate Scrutiny, from that of Alum. And has often obſerved rectifyed Oil of Vitriol and Spirit of Sulphur to coagulate and become ſolid tranſparent Concretions, exactly like Alum cryſtalized, with which compared, he is perſuaded, that the moſt judicious Eye, without the Aſſiſtance of the Palate would find little difference.

rious Earth in it than the laſt. 22. Since the Chalybeate Water both ſtrikes a deeper Tincture, lets fall more Sediment, and retains its tincturing Property with Galls longer than the Spaw, we ſay the firſt is a more powerful and ſtronger Chalybeate than the laſt. 23. From both Spaws receiving a much deeper Tincture in Winter than Summer, by Galls, Sumac, *&c.* and alſo their retaining that Property longer in the firſt than laſt mentioned Seaſon, we ſay they are ſtrongly impregnated and more retentive of their Chalybeate Principle in Winter than Summer. 24. Since both Waters precipitate Silver out of its Solution in *Aqua Fortis*, then both contain marine Salt. 25. Since the Spaw when freſh or putrid, brightens Solution of Gold, and when ſtinking, is jet black with Solution of Silver, Sublimate, or Sugar of Lead, lets fall a ſtinking inflammable Sediment; it therefore contains Sulphur: But the Iron-ſtone abounding with Sulphur, and conſiſting of Vitriol, Sulphur, and Ocre, the firſt and third being corroded by all Salts, yea the Water it ſelf, therefore the Sulphur is likewiſe from that; for Sulphur being the Cement which binds the Alum and Earth together in the Alum-ſtone, were this Cement diſſolved and commixed with the Water, we muſt alſo have the Alum with it, ſeeing it's as diſſolvable in Water as other Salts, when ſet at liberty from earthy Matter. 27. Since all Salts, and Water corrode and diſſolve Iron, but not Earth, hence the Reaſon of Vitriol, Ocre, and Sulphur in the Spaw, but not Alum, whoſe Earth is a ſtony Matter. 28. Since Tincture of Nephritick Wood turns theſe Waters green by ſtanding, Oil of Tartar, Spirit of Hartſhorn, and *Sal Armoniac*, change it white, and occaſion much Sediment, therefore theſe Waters contain much Nitre. 29. Seeing Solution of Sugar of Lead, makes the Water white, and throws down much Sediment, and alſo much white Sediment remains after exhalation of the Water, and ſeparation of the Salt, we ſay it contains Earth. 30. But the Water turning Syrup of Violets green, and raiſing a ſtrong inteſtine Motion with the acid Spirits, and the Earth when ſeparated from its Salt, huffing, ſmoaking, and fermenting with Oil of Vitriol, Spirit of Salt, *&c.* we ſay this Earth is Alcaline. 31. But this Earth being white, exceeding Alcaline, even before it is calcined, and affording the ſame Kind of Salt with Lime-ſtone, we call it a calcarious Earth. 32. This Water being much more diſpoſed to run into Putrefaction, and its Corruption much greater than that of other Water of the like kind, we ſay it contains more Sulphur than any other we know of, wherein the Sulphur is imperceptible when freſh. 33. From the whole, we ſee that this Water contains both volatile and fixt Parts, the firſt are its Spirit, Sulphur, and Vitriol. The Firſt is the meer Effect of the Diſſolution and Mixture of ſeveral Minerals; the Second it has from five to nine Grains to three Pints, or a Quart of the Water; the Third, it has to about five Grains to a Gallon in the Spaw, and ſeven Grains to a Gallon of the Chalybeate. The fixt Parts are Nitre, and Marine Salt, which make up two Parts of the Sediment in the Spaw, for the Sediments remaining after Exhalation are in ſundry Proportions (according to the different Seaſons, and height or lowneſs of the Water) being as 1 to 162, and ſo on till they are as 1 to 204, the Salt to the Earth is as 2 to 1, the Marine Salt to the Nitre is as 1 to 16 or 18. The middle Proportion of the fixt Parts in the Chalybeate, is to the Vehicle as 1 to $274\frac{1}{3}$. The Salt in this laſt, is to the Earth as 9 to 5, the Marine Salt of this Water is to the Nitre, as 1 to 12. Now Vitriol is the Salt of the Ocre, hence it is ridiculous to make Vitriol and Iron or Ocre, diſtinct Principles. 34. We ſee alſo that when the Volatile Principles are largeſt in the Waters, the fixt are leaſt, and *vice verſa*, when the fixt are moſt, the volatile are ſmalleſt. 35. Seeing the Colouring and precipitating Property of theſe Waters with Galls, *&c.* is ſo quickly loſt, together with their ferruginous Taſte and Smell, their vitriolic Principle muſt be very ſubtle, conſiſting of very ſmall and few Particles, therefore ſoon gone. 36. Theſe mineral Spirits, and vitriolic Principles, being (as we ſhall ſee afterwards) the moſt medicinal and efficacious Parts of the Water, and ſo exceedingly volatile, then ſuch as would expect and reap any great Benefit by theſe Waters as Alteratives, muſt repair to the Spring, and not depend upon them when carried to any Diſtance, or kept any Time. 37. Finding it impracticable to procure any Cryſtals of Salts from the Petrefactions (except a little Vitriol from ſome of them) tho' they are richly ſtored with Salts, the inſtantaneous Tranſition of their Colours, and the Diminution of the Salt in the Water by ſeveral Exhalations, Filtrations, *&c.* we ſee 1. The ſmallneſs of the Particles of this Salt. 2. That the Salt of Mineral Waters is not to be taken in a chymical but natural Senſe. 3. How difficult it is to tell exactly the given Quantity of nitrous or vitriolic Salts in

Mineral Waters. 38. From the Waters continuing to purge, and purge better after both their mineral Spirit, and vitriolic Principles are quite gone, yea and after they are become *fœtid*, and freſhed again (having loſt their ſubtilized Sulphur) we ſee their purgative Property lies not in their volatile but fixt Parts. 39. From the different Quantities of Sediment in theſe two Springs, and the ſundry Proportions neceſſary for Purgation, we ſee that the purgative Property lies in the Contents chiefly, and not the Water. 40. Since the Salts purge when ſeparated from their Vehicle and Earth, then the purgative Quality lies in the Salt. 41. Since this Water purges, and ſeveral others, both of the ſame, and different kinds, impregnated with the ſame Salt, but in a ſmaller Proportion are not purging, we ſee that the Reaſon why ſome purge, and others not, is not from the Genus but the Quantity of the Salt. 42. From the ſweetiſh ſaline Taſte of this Water, when the vitriol Principle is gone, its diſpoſition to Putrefaction, and the ſeparability of Sulphur from it, it is evident that this Salt comes the neareſt to *Sal Polychreſtum* of any artificial Salt. 43. From this Waters purging better in Bed than up, warm than cold, we ſee Relaxation promotes its Operation this Way. 44. Since this Water is ſo quick and powerful a Diuretic at the Spring, goes ſo ſuddenly and eaſily off the Stomach, but being of a ſlower Pace when drunk at a Diſtance or long kept, when it is a ſmaller or ſlower Diuretic, but more purgative, we ſee that this diuretic Property is greatly promoted, and next to the common Vehicle, is chiefly owing to its mineral Spirit and vitriolic Principle. 45. The very different Colours and ſome of them inſtantaneous and ſurprizing, produced by the ſame Things dropped into the Water, wherein the ſlightly burnt Petrefactions had been infuſed, ſhew either theſe Petrefactions to contain a different Sort of Nitre from that in the Spaw, or it is combined with other Principles, or the ſame Principles are differently ranged proportioned or modified, or the Fire has volatilized the ſame Salt. 46. Tho' the Earth of this Spaw when carefully and neatly got be white as Snow, yet when calcined, a Part of it being attracted by the Load-ſtone, and the reſt of it agreeing in all reſpect with fine crude Lime-ſtone Powder, which produces none of the *Phænomena* of Alum-ſtone, where then is the Alum Glebe. 47. Since this Salt ferments neither with Spirits of Salt, nor of Hartſhorn, we are ſure it is neither acid nor alcaline,

line, but neutral. 48. Seeing by ſtanding it loſes its vitrolic Principle and Sulphur, then the longer it is kept the more alcaline it is. 49. This Water purging ſeveral when drunk at the Spring, that it operates not upon in the Town, with the ſame Degree of Exerciſe, it hence appears that the Loſs of the mineral Spirit depauperates the Water and hinders its ſpeedy Paſſage through the Body, as well by ſtool in ſome as by Urine in others.

Having now ſeen what the Principles of this Water are, and whence they proceed, let us next obſerve what are its primary medicinal Intentions, and how they are anſwered by its ſundry Principles, and firſt being a chalybeate, it is *de-obſtruent* or opens Obſtructions whether in the larger or ſmaller Veſſels, as in the Liver, Spleen, Meſentery, Kidneys, Uterus, *Ovaria*, Lungs, *&c.* Hence it is good in obſtructed, diminiſhed, depraved or irregular *Menſes*, or Sterility from want of due Quantity of Blood brought to the *Uterus* or Obſtructions in the *Fallopian* Tubes or *Ovaria*; beginning diminiſhed Secretions in the Liver tending to a Jaundice, Inflammation, or Schirrus, or in the Spleen, therefore ſerviceable in the Hippo or other Diſorders from a ſlow Motion of the Blood in, or a Diſtention of the abdominal Viſcera, in Hyſtericks, eſpecially, when 2. We conſider its much ſtimulating, invigorating evacuant nitrous Salt, whereby it attenuates, groſs, ſizy, mucous Humours, gives a pleaſant Pungency to the Veſſels, thereby excites the Force of the Solids over the inactive ſlow moving Fluids, fits them for and promotes their Expulſion. Hence it is good in a Cachexy, beginning Dropſy, Cacochymy, too great Corpulency, fulneſs of the Veſſels; therefore is excellent to prevent Apoplexies, Palſies, Lethargies and other Diſtempers from either a Plethora, or Slugiſhneſs of the Fluids, and Laxneſs, Diſtention or Inſenſibility of the Veſſels; and alſo to prevent Gout, arthritic or rheumatic Pains, with all other Diſeaſes which may be occaſioned from Idleneſs, Luxury, Intemperance, Diminution or want of ſome natural Evacuation: For the ſame Reaſon it is good in Headachs, chronic autumnal Agues in bulky unwieldy Habits, and in Worms of all Kinds, expelling the Mucus of the Inteſtines wherein they breed, lie and lay their Eggs. And in Aſthma's from either a too great loading of the pulmonary Veſſels, or their being ſtuft with flegmatic or ſizy groſs Humours; or in troubleſome waſting Catarrhs, by giving the Defluxion a turn, and opening another Door for it, till the weakened Veſſels have recovered their decayed Tone; in habitual Coſtiveneſs of the Body, Diſtention of the Belly; and finally to purge off the Dregs of ſmall Pox, Meaſles, Agues, venereal Taints, *&c.* Add to theſe 3. Its alcaline Earth, whereby it ſheaths, ſweetens, and haſtens the Expulſion of all acrid, acid or ſharp Humours: Hence it is good in bilious Colicks; Heartburn, Gripings, Hemorrhages by Stool, Urine, Vomiting or Spitting up Blood from the Lungs, occaſioned by a Saltneſs and Sharpneſs of the Blood, troubleſome tickling Coughs from the ſame Cauſe, or Convulſions therefrom, or any ſharp tearing Pains; or finally wherein the teſtaceous Powders can be of Uſe in chronic Diſorders, this Earth will do Service. 4. From its mixture of Sulphur together with Nitre, it is eminently ſerviceable in the Scurvy either in the Blood or on the Body, and in almoſt all ſcorbutic Symptoms, as wandring Pains, Defedations of the Skin, Ulcers, corroſion of the Gums, emaciating of the Body, *&c.* 5. From the common Vehicle and cleanſing attenuating Salt, it is exceeding good in all Diſorders of the Stomach, ſtops Vomitings, Belchings, Hiccup, and cures its Flatulency, reſtores a good Appetite, and ſtrong Digeſtion; is good in ſtone, Gravel, mucilage or Sand in the Kidneys or urinary Paſſages, and in Stoppage or Heat of Urine, nephritic Colicks; in Inflammations or Ulcerations of the Kidneys, Ureters or Bladder, in Thirſt, Heat of the Stomach or Body, hectic Fevers and Palpitation of the Heart Hence we ſee from their different Principle, mineral Waters are able to anſwer a great many and even different Indications, this Water juſtly challenges the Preference of all the yet known mineral Waters in *England* for a ſafe, pleaſant, eaſy, cooling purge; an Effect which neither Carriage, Keeping nor Petrefaction do diminiſh, and at the ſame Time it purges, it diminiſhes very little the other Evacuations, and at the ſame Time it reduces the Bodies bulk, its Drinkers ſenſibly recover Strength, becauſe it rouzes a languid Circulation, encreaſes diminiſhed Secretion, empties and braces up the relaxed and diſtended Veſſels; fills the Chyle for better Digeſtion, Secretion and Nutrition: Hence a plentifuller Stock of nervous Juice, and greater Alacrity and Activity. It is a Water ſuited to all Ages, Sexes, and Seaſons, even to Children, Women with Child and old People, and is a better Alterative or *Deobſtruent* in Winter than Summer, and a ſtronger Purgative in the laſt than firſt.

As to Rules or Directions for the right Uſe of theſe Waters, having before given theſe from Doctor *Witty*, I ſhall be very brief here. And firſt, the Perſon that has any great Expectation or valuable Deſign to anſwer from theſe Waters, ſhould make ſhort and eaſy Journeys to them, in hot Weather eſpecially, and not fatigue himſelf by over travelling, nor over heat his Body by riding Poſt, or drinking ſpiritous and hot Liquours, whereby he would ſtand a good Chance of a Fever to ſet out with. 2. When n got there it is adviſeable that he begin not his Waters for one, two, or three Days, till he refreſh his Body, recover his Fatigue, Stomach and Appetite, and the diſturbed Secretions and Evacuations return to their natural, regular Channel. 3. If the Body is coſtive, or ſlow, or the Belly foul and loaded, let him take a Laxative of Rhubarb, *Glauber*'s Salt, Cream Tartar and Lenitive Electuary, or ſome ſuch Thing as his Phyſician ſhall judge moſt proper, to clear the firſt Paſſages and make Room and Way for the Water. But as to ſtrong Purges of Jallap, Scamony, *Pillulæ ex duobus*, *Cochiæ*, &c. they are contrary to all both preſent and future Deſigns, they excite a Feveriſhneſs and Heat in the Body, cauſe Thirſt, drain off the thinner Part of the animal Juices, thicken the reſt, encreaſe Obſtructions, ſpoil the Appetite, and weaken the Stomach and Bowels. If the Stomach is loaded and palled give a Vomit, or if the urinary Paſſages are plugged up with Gravel, Sand or Mucus, after the Belly is opened and cleared give ſome irritating Diuretic, as Tincture of *Cantharides*, Spirits of Nitre or Turpentine, *&c.* or if the Stoppage of Water be from a Contraction of the Strainers by a violent and long Stimulus, oily Softeners and Opiates are beſt. In too great a Fullneſs of Blood, a Vein may be opened to promote a more eaſy Circulation, perfect Secretions, and relieve the diſtended Veſſels. But as to Preparatory Courſes, I declare I have no Notion of them; for either the Water will do, or not do; if the firſt there is no need to teaſe and load Nature with Medicines, ſince they generally go but indifferently down, for they ſeldom miſs to pall and nauſeate the Stomach, diminiſh or deſtroy the Appetite and Digeſtion; if the Waters will not do, put the Patient either upon a proper Courſe of Phyſick, or ingenuouſly recommend him to other Waters more ſuitable to his Purpoſe. And what I ſay of Preparatives, the ſame I ſay of intermixing Medicines with the Waters, which cannot fail often of preventing the Succeſs of the Waters wholly, or much and unneceſſarily protracting the Uſe of them before they anſwer. 4. Let them begin with a moderate Doſe, as a Pint or three half Pints, and encreaſe it after two or three Days till they find the Water anſwer, and come to a proper Quantity. Hereby the Water will find an eaſy Paſſage, gradually dilate the Veſſels and open the Outlets, the Stomach not palled nor the Body diſturbed, by throwing in large Quantities at firſt, which might fill the Body, dilate, diſtend, or relax the Veſſels, mar or vitiate the Secretions, weaken the Stomach, throw the whole Œconomy into a Deluge, and be of very dangerous or fatal Conſequence: After this let them encreaſe the Doſe half a Pint daily, till they reach to ſeven or eight half Pints, and as the Spaw is not ſo much an Alterative as Evacuant, leſs will ſcarce anſwer the Generality of Conſtitutions; when it is uſed as an Alterative to remove ſome great Obſtructions, the Chalybeate ſhould be drunk, then a Quart is a large Doſe. 5. Let them not ſwallow the Water down too greedily, but begin at ſix a Clock, and drink a Pint every Hour, ſo as it be over at nine a Clock, uſing gentle moderate Exerciſe between every Doſe, as walking, riding in a Chaiſe or Chariot. Beware of ſtrong and violent Exerciſe, which both directs the Water to uncommon Outlets, throws it too ſpeedily into the Blood, and ſwells the Veſſels, hinders its Operation by Stool and Urine, but is eſpecially hurtful to ſuch as are liable to Hemorrhages of any Kind. 6. Nor do I by any Means commend their Broath Breakfaſt, when the Stomach, which by all Means ſhould be kept in Order, has been ſufficiently palled with Water before; Broath then relaxes its Tone, and renders the Appetite more remiſs, but green Tea of a middle Strength, braces it up again, keeps up Digeſtion, and being reſtringent and diuretic carries off the Remains of the Water. This change I adviſed ſeveral to (who could not get rid of their Water before four or five a Clock at Night) and had hearty thanks for it. 7. Such as have very weak and cold Stomachs may eat candied Ginger, candied Angelica or Orange Peel, or ſome ſuch Warm Stomachic. 8. All improper Diet muſt be avoided, as Fiſh, (and yet it is ſtrange to ſee how free they make with it here, as tho' this and not the Waters were to cure them, when more oppoſite Diet can ſcarce be imagined) Geeſe, Ducks, Cheeſe, Pork, Bacon, ſalt Meats, Salads, Cabbage, Carrots, Ale, Spirits, Drams, and whatſoever is of ſlow and hard Digeſtion, groſs Nouriſhment renders the Blood thick and ſizy, or encreaſes Obſtructions. 9. Fly Idleneſs, day Sleeps or Naps, fleſh Suppers, late ſitting up, lying long a Bed in a Morning, Drunkenneſs, Tippling, Intemperance, *&c.* 10. Such as are aſthmatic, epileptic, conſumptive nephritic, hectical, *&c.* ſhould uſe conjugal Pleaſures with great Caution and Diſcretion, for as I have known the Uſe of this Water give ſome a pretty briſk Priapiſm, it was not improper to give this Hint. 11. Wherever an Encreaſe of the Blood's Quantity, Motion, and *Momentum* is to be dreaded, the Uſe of this Water muſt be ſparing or refrained as in a *Diabetes*, Dyſentery, large Stone in the Kidneys, inward Impoſtumes, *&c.*

Now to touch a little upon ſome of the notorious Miſtakes and Errours committed by the former Writers on this Spaw, for to mention them all or half, would ſpend much time to no Purpoſe. And *Firſt*, *Simpſon* tells us that a Solution of mineral Alum in common Water, or a Solution of Vitriol of Steel, have the very Taſte of the Spaw; but it is not likely that either one or both ſhould do it, one muſt give Water a ſweet ſtyptic Taſte, the other a tart harſh inky Taſte, the Spaw being impregnated with a neutral Salt and an alcaline Earth. *Secondly*, Neither *Whitby*, nor *Scarborough* Alum-ſtone (ſimple without Iron Marcaſites or ſome of their diſſolved Tincture or Earth, mixed with them, or lying upon them) calcined nor uncalcined, will ſtrike purple with Galls, nor are we to expect it, ſince Alum is no more than the Acid Sulphur joined to an earthy or ſtony Matter, but Vitriol is this acid Sulphur joined to a metallic Body of Iron eſpecially. Tho' I could find but little Alum-ſtone, that would not ſtrike Purple with Galls, after ſome Hours ſtanding, but the Reaſon was a vitriolic Subſtance joined with the Aluminous, for if a *Lixivium* of this calcined Alum-ſtone was ſet by clear, it would ſoon let fall a Sediment, called by the Workmen Slam, which is its Vitriol. 3. Neither the Clay of the Cliff, nor that fallen down on the Shore will ever ſtrike Purple, with Tincture or Powder of Galls, or other Aſtringents, except it contain diſſolved Iron-ſtone or its Marcaſites. And as to the Lumps of Clay fallen down turning to Iron, as Doctor *Witty* aſſerts, it is impoſſible: Iron indeed it contains, as all ſtrong, ſtiff reddiſh Clay does, which alſo hardens; but the Hardneſs of this is firſt, from the Nature of the Earth dried, and then from the great Quantity of Sea Salt, wherewith it is continually filled at every Tide which is afterwards backed and hardened by the Sun's Heat in Summer. But had he made as ſtrict Obſervation on this, as on the Effects of the Spaw, he would have been convinced, when he conſidered firſt, that the greateſt Part of this Clay falls from a greater Height in the Cliff, than the Minerals commonly lie in, they not extending ſeven or eight Yards above the Sands, and moſt of the other falling twenty or thirty Yards or more above this Level, where is only Clay and Gravel; and then of the many thouſand Loads of Earth tumbled down in many Ages, few remain, being firſt ſoaked by the Winter Rains, then diſſolved and crumbled in Pieces, and carried off by the Tide, which would be impoſſible were it Iron, or converted to Iron. 4. Neither do the ſaline Efflorefcences on the Cliff contain a Grain of either Alum or Vitriol, for of theſe higher up, I gathered a Hatful, diſſolved and infuſed them in Water, filtred the clear, boiled it to a *Lixivium*, ſet it by to cryſtalize, and it projected Nitre, and only Nitre. I tried thoſe lower down the ſame Way, and I had mixt Cryſtals, partly Nitre and partly marine Salt, from the Tide at high Water, waſhing the lower Parts of this Bank. 5. Doctor *Tonſtal* with no ſmall Aſſurance tells us once and again, that the different Principles of the Sediment, and their Quantities, are theſe: In three Ounces and three Drams, there was one Ounce two Drams of Raments of Stone, of Nitro-aluminous Salt one Ounce ſix Drams, of Glebe of Alum three Drams; ſtone Powder and Salt are near equal. Strange that Men ſhould thus confidently aſſert without convincing Proofs, and pledge their Faith for that which After-Enquirers muſt unavoidably find a Cheat. But what follows with the ſame ſerious Air is ſtill worſe; boil your Water, ſays, he, till half conſumed, ſtrain the Liquor and ſee what Sand you have; exhale the remaining ſtrained Liquor to the Thickneſs of Oil, pour it into a wooden Veſſel, and you have the nitrous cryſtals; exhale the reſt of the Liquor, get its rock Salt by Solution and Filtration, exhale the filtred Water, and burn the Sediment in a Crucible, and you have the blue Clay or Alum Glebe; diſſolve the firſt Cryſtals, exhale the Water, and you have more Earth, yea you will have little beſide nitrous Stone. Before it was half Stone-Powder, half Salt; now it is all ſtone-Powder, worſe and worſe; where is now the noble Eſſence of the Spaw, that before was fit for the Cup of the King, ſeeing it is all Stone-Powder fit for the Bricklayers Trowel? Had I time to go through their Aſſertions it would be fine Buſineſs, but firſt let the Salts be nitrous, vitriolic, Aluminous or marine, they ſhould have cryſtalized them, this had been the Way to put the Matter upon a fair Iſſue, and convincingly ended the Controverſy, the Cryſtals of all the mineral Salts unalterably and continually preſerving their Figures; for Alum will never project Cryſtals of Nitre, or of any other Salt but its ſelf. Marine Salt can never be metamorphoſed nor compelled to change its Cryſtals for thoſe of the Alum; nor will Nitre vitriolic Cryſtals, ever put on the Shape of Alum, Nitre or Sea Salt, *&c.* Say they, we did cryſtalize them; but how? In two or three Hours, or a Night's Time, upon the Earth. Quick Cryſtals indeed! It coſt me ten Weeks to procure fine ones, but not like Doctor *Liſter's*, which quickly fell down in Duſt, but mine will laſt Years if not expoſed to Air. Becauſe their Salts cryſtalized into *Stiriæ*, therefore theſe muſt be Nitre; ſlight Evidence indeed. So will Oil of Vitriol in the Winter time, the ſame will marine Salt and Vitriol, if there is either too great a Mixture of Earth, or a weak *Lixivium* expoſed in too large a Veſſel, or a Want of Salt to form full and regular Cryſtals, or expoſed too little a Time to the Air; and I know of ſeveral Faults both in the Management of the Waters, and Errours in Exhalation, effectually to prevent obtaining Cryſtals from any Kind of Salt, as I am acquainted with ſome very eaſy Methods quickly and certainly to determine the Genus and Quantity of any Salt or Salts impregnating mineral Waters, but theſe are not my Buſineſs in this Work. But to give a faithful and true Hiſtory of the Contents of our ſundry medicinal Springs, and therefrom deduce their Effects ſimply, without any Flouriſhes, on the Cauſes remote or proximate of Diſeaſes, with the State of Solids and Fluids in the Body, nor to ſpin out a long Harangue how theſe Principles act upon our Juices, and produce their Effects, the Gentlemen of the Profeſſion are abler Hands to do this than I am, and it would be labour loſt to others.

Several both formerly and now ſeem fond of Alum in Waters, and pretend to demonſtrate it from chimical Experiments, but they know little of Metals, for their Alum taken out of the Heap of burnt Alum-ſtone, contained either Coal, Smoak, Vitriol or Marcaſites of Iron, without which we find little Alum-ſtone. That there is conſtantly ſuch a Mixture with the Metal of Alum is plain from that plenty of Sulphur, which is always found on the Top of the Heap in burning. Beſides the Effects of medicinal mineral Waters are intirely oppoſite to thoſe of Alum, one is opening, the other binding, one cleanſes the Veſſels, the other conſtringes or contracts them. *Holt* Waters are ſaid to contain Alum, but examine them, and they only produce Nitre and calcarious Earth, without the leaſt Mixture of any other Salt. 2. Inſtead of dedicating their Book only to the Royal Society, they ſhould have ſent up the Sediment of the Water it ſelf, let them have ſeparated its Earth and cryſtalized its Salts; this had convinced the World that this Spaw contained only Nitre and a little marine Salt; without either Alum or fixt Vitriol. But 3. To the great, great Objection, that one half, nay upon ſecond Thoughts the whole Sediment was Nitrous Stone and Alum Glebe. I took therefore four Pints and a half of this Spaw, exhaled it very carefully and cleanly to one Pint, ſet it down, let it ſtand all Night, filtred the Water, dried the white inſipid Earth, which weighed forty Grains. I exhaled the filtred Liquor again to half a Pint, let it ſtand another Night that all its earthy Parts might ſubſide, poured it off and filtred it. I had eleven Grains more Earth. This filtred half Pint I exhaled next Day to one half, let it ſtand that Night, and filtred it next Morning, I had nine Grains more Earth; then I put a fourth of a Pint of diſtilled Water to the little filtred Liquor that remained, and exhaled it to one fourth, took it off the Fire let it ſtand till it ſettled, then filtred it and there remained three Grains of Earth; then I added ſix Ounces more diſtilled Water to the little remaining filtred Liquor, exhaled them away to about two Ounces, let it ſtand till it ſettled, then filtred the clear, and I had two Grains of Earth; then laſt of all I exhaled this filtred Liquor, and I had of a very beautiful white Salt ſeven Scruples and a half, the whole Earth obtained was about ſixty ſix Grains, both Earth and Salt were ten Scruples ſixteen Grains. Now ſuppoſing the earthy Parts of the Water were not ſo much united by the firſt Exhalation, as to form little Bodies larger than the Pores of the Paper, and ſo get off with the Salt, yet ſure they had time enough to unite in the other Exhalations; ſo that what paſſed one Time might have been catch'd another. 4. But ſay the Dirt drivers, (it is *Tonſtal's* own Phraſe) had you diſſolved this Salt and filtred it, you would have found more Stone Powder, and ſo a ſecond and third Time, till nothing but Stone Powder had remained. Truly ſo I did, and Stone Powder I had each time, but what then? I knew the Spaw contained a natural mineral Salt and not a chimical, which is Salt only diveſted of its other Principles; for if it had been chimical Salt, as Spirit of Nitre, Salt, or Oil of Vitriol, who would have drunk daily four Scruples of this Salt for a Month, and not been killed in half the Time? It is one of the admirably wiſe and provident Contrivances of Nature that we have no ſuch thing naturally as theſe chimical Salts, to extirpate the humane Race, but they come to us ſo tempered, as not to be miſchievous but wholeſome. I had alſo ſtone Powder at each Exhalation of the ſame Waters from *Buxton*, tho' St. *Annes* contains the fineſt brighteſt Salt and leaſt Earth of all others I have met with; the ſame I found it in *Bath* Waters, *Briſtol*, *Holt*, *German* Spaw, *Pyrmont* Waters, *&c.* Nay I went yet further, for I infuſed a good Quantity of Lime out of an old Chimney, in warm Water, let it ſtand two Days, then poured off the very cleareſt, filtred and exhaled it; diſſolved the Salt in Water, filtred it again and there remained much Earth; this I did a third Time and had ſome Earth, ſo that this is common to all nitrous Waters, *Nitrum Muriale* it ſelf not excepted. Let not then any ſober ingenious Man quarrel with one before he has tried ſeveral others, and if he find the ſame thing common to all, let him not be prejudiced againſt one and not the reſt. But when Men have ſacrificed Honour and Honeſty to Hypotheſis and Prejudice, ſplitting upon ſuch Rocks is unavoidable. To what ſorry Shifts are they driven? I took ſome of the blackeſt of this old Lime which was pretty black with Coal Smoak powdered and infuſed it in warm Water; when very clear, powder of Galls turned it of an Opake blackiſh Purple, from the Vitriol in the Soot and Smoak; Tincture of Rhubarb turned another Glaſs of it Blood red from the nitrous Salt of the Lime. But you can obtain no Cryſtals from Lime Water; even the ſtrongeſt *Lixivium*. Nor will any Nitre, except that which is calcined in the Stone, turn Tincture of Rhubarb red. Again, I exhaled two Quarts of *Scarborough* Water, it left ſeven Scruples and a half of Sediment, whereon I poured warm Water, filtred and exhaled it, and I had of very white Salt four Scruples eighteen Grains, which want only one fiftieth Part of two thirds Salt to one of Earth. But it took ſix ſundry Waters before I could ſeparate the whole Salt from the Earth, and I ſuppoſe the Gentlemen contented themſelves with one Water. A certain Sign to know when you have got all the Earth from the Salt is, that then it ferments not with Oil of Vitriol nor Spirit of Salt, which it ſtill does till then, and ceaſes not before. I loſt eight Grains of the

Sediment in this Operation, which muſt be Salt not Earth, for it is impoſſible the laſt ſhould be loſt. When I weighed the Cape dried carefully before uſing, and after I tried to procure more Salt from this Earth by pouring acid Spirits upon it till it ceaſed Fermenting, then put Vinegar to it, filtred it, and exhaled; a few Grains of Salt I had, but it was chiefly that of the acid Spirits incorporated with ſome Earth. 5. They cryſtalized the Salts of this Water into *Stiriæ*, and yet it is all Earth; ſtrange, Earth cryſtalize! I wiſh they had given us its Figures, that we might have known whether different ſorts of Earth will afford ſundry kinds of Cryſtals like Salts. The Sediment is all Earth, and yet it is a nitro-aluminous Salt! It is all Earth, and yet the Spaw petrefies! Who ever ſaw Earth petrefy without any Salt? It is a petrefying Water, and yet it has an aluminous Salt! Who ever heard of aluminous Waters petrefying? I am really weary with ſuch Contradictions and Nonſenſe. ----------6. Theſe Gentlemen never attended to the Loſs of Salts in their Exhalations and Operations, for all Medicinal vitriolic and nitrous Waters loſe conſiderably of Salts in their Operation, even ſo much, that without a comparative Eſtimate, a Man could not poſſibly know the given Quantity of theſe Salts in any Mineral Water, tho' he may know what any Mineral Water leaves upon Exhalation, but the volatile Vitriol and Nitre are both gone by this. Indeed marine Salt is more tame, nor will Alum take the Wing ſo ſpeedily; and it is really ridiculous to expect a Chimical Salt ſhould be left upon ſimple Exhalation, Diſſolution and Filtration, which was what *Tonſtal* ſought, and quarrelled with *Scarborough* for, becauſe he found not here a Body, or part of Matter diſſolvible in Water, fluxible in the Fire, and ſo ſimple, that every part of it has the ſame Reſemblance to the whole, being the moſt ſolid, compact, and fixt of any Body ſtript of its Earth, Flegm and Oil, but kind Nature produces none ſuch; we are content to find a Subſtance diſſolvible, and commiſcible with Water, of a ſharp, ſaline, pungent Taſte on the Tongue, which Pungency gives a Stimulation, and is one great cauſe of the Waters Operations on the Body; as the Smallneſs, Solidity, and penetrativeneſs of its Parts, are the great Means of its being an Alterative. Theſe poignant, penetrating, acid, active Spirits, are produced by Chimiſtry, from Sea Salt, Vitriol and Nitre, which quickly deſtroy the Texture even of Metallic Bodies, and burn and corrode as other Cauſtics. Animal Subſtances were by no means proper for the humane Species to ſwallow alone, therefore have we them naturally joined to a Portion of Earth, Flegm and Oil, to prevent their miſchievous Ravage on our Fabrick; *Tonſtal* will alſo have ſoft Alum-ſtone out of the Rock turn Purple with Galls, but let him firſt ſee that there was no Iron-ſtone, Marcaſites, Ocre, or diſſolved Vitriol in it or near it; if none of theſe, his Alum-ſtone Water will never turn Purple with Galls. He will have the Sediment of the Spaw in Oak Veſſels, to be only the Wood abraded by the Acids. Then the Sediment of the Water in Bottles, is alſo the Glaſs abraded by the ſame Acids; for he ſays the firſt will burn in the Fire, which is a groſs Miſtake and Impoſition. Again, Galls with Spirit of Nitre turns Infuſion of Alum-ſtone Purple, which is equally falſe, but however this is better managed than the reſt. This Spirit not being every Man's Pocket-piece, therefore not ſo readily detected, but if the ſimple Infuſion of Alum-ſtone, turn Purple with Galls, what need of this Spirit? *Simpſon* thinks he has unanſwerably done with the Buſineſs, when he has told us that the Alum-Well at *Harrigate* turned Purple with Galls; but what is this to the purpoſe? a thouſand Loads of thoſe Concretions contain not a Grain of Alum, nor yet the Water. *Witty* ſays Alum diſſolved in Water tinctures not with Galls, but is it like, when the Mineral Alum is loaded with the Alcali's of Kelp and Urine? And ſuppoſe the firſt ſhould, the Experiment on this factitious compounded Body is not fair. The juſt way had been from Infuſion or Lixivium of pure clean Alum-ſtone to have obtained Cryſtals, let theſe dry, then diſſolve them in Water, and if theſe diſſolved tincture with Galls, they might have thence drawn a Concluſion; but it will not. He ſays neither Infuſion of calcined Alum-ſtone nor Iron-ſtone turn Purple with Galls, he is out in the laſt, for not only Iron-ſtone calcined, but Infuſion of Steel-filings in warm Water turn Purple with Galls. And thus theſe Gentlemen are out in moſt of their Experiments and Aſſertions, ſcarce one in ſix of their Experiments will hold, nor ſeem they to have had the leaſt regard to Truth in their Writings, being determined to oppoſe Dr. *Witty* right or wrong. As to what *Tonſtal* ſays in his Dedication to the Royal Society, *viz.* That

Scarborough Spaw, tho' a petrefying Water lays no ſtoney Cruſt on things put into it; for it runs out of the South, and in a direct Line Southward, a Mile or two diſtant beyond the great Mountains, there is a Hydrophylacia, a ſtately Lake abounding with Fiſh; here is the Spring-head of *Scarborough* Spaw. It paſſing forthwith through the Root of thoſe ſtoney Hills, firſt diſſolves the Stone, and hath fully performed the Act of Corroſion on it, before it come to the Cliff. This being done, it then corrodes Alum-ſtone, and in this ſecond act of Corroſion, the Spaw appears at the Bottom of the Cliff, after the Corroſion is compleated, which happens in a Day or two. Now if this be ingenuous Dealing, or if it is not the laſt Refuge of a forlorn Hope, a pitiful Shift to ſupport a ſinking Hypotheſis, a wretched Pillar for a bad Cauſe, let the World judge. Let us take it as it lies, 1. A petrefying Water incruſtates nothing laid in it, if it run out of the South; a nice Obſervation to hold. 2. This Hydrophylacia or Lake, is the Head of *Scarborough* Spaw, it paſſing forthwith through the Roots of thoſe ſtoney Hills; we ſhall preſently find this a willful deſigned Miſtake. 3. It diſſolves the Stone, and hath fully performed the act of Corroſion on it before it comes to the Cliff. *Gratis dictum.* Did he, or had he an opportunity to ſee and know this? 4. When it has juſtly performed its act of Corroſion on the Stone, *i. e.* when the acid Salt or Sulphur is ſo much ſaturated with the Alcali till it ceaſes to be an Acid, or has its poignant Parts all ſheathed and ſhut up in the Stone-powder; then when it comes to the Cliff, it corrodes the Alum-ſtone, after which ſecond Corroſion the Water appears at the Bottom of the Cliff, in two Days time. The Acid was ſpent, yet here is a new Acid, but whence? the firſt was in the Water of the Lake, and yet it abounded with Fiſh, tho' we know Fiſh cannot live, far leſs thrive and breed in vitriolic or ſulphureous Waters. Now this Acid muſt either be Sulphur or Vitriol, for we know all freſh Water contains Nitre, and without Nitre no Vegetation, therefore Nitre it cannot be; it is aſtoniſhing to ſee Men run themſelves into ſuch Dilemma's. But let us read Grammatically, and it is thus. A Mile or two diſtant beyond the Mountains, is a ſtately Lake of acid corroſive Water, in which Fiſh abound; this Lake is the Springhead of *Scarborough* Spaw, it paſſes directly through the Roots of the ſtoney Hills, (a Mercy it flows not over their Tops) it corrodes firſt the Stone in the Root of thoſe Hills, (you find it had its Acidity in the Lakes, for it meets with none in the Road, that we hear of) till its ſaturated, then it eats the Alum-ſtone in the Cliff, (an unmannerly hungry Water indeed that muſt have two belly fulls in a rapid Courſe of a Mile or two;) after this it halts and breathes a Day or two under the Baſon of the Spaw, ſo ſprings up. The Story is this, There is a very large Collection of Water from all ſides of a Range of Mountains, conſiſting chiefly of Lime-ſtone, and round this Mer; this Mer has no Inlet, but diſcharges ſuch a large Rivulet, as keeps ſeveral Corn Mills going, beſides a conſiderable waſte Water, even in Drought; but he tells us not a Word of this Outlet, but would have us believe that this whole Mer is diſcharged by the Spaw, and has no other Drain. Nor 2. Can the Spaw be poſſibly ſupplied from this Mer, the Soil being very ſtrong and thick, ſcarce allowing ſo remote a Percolation, the Mountain being at leaſt a computed Mile thick, and a Cement of Clay, Gravel, Lime-ſtone, Iron-ſtone, Alum-ſtone, in different *Strata*. 3. Nor is the Water under any Compreſſion or Reſtraint, that it muſt neceſſarily force its way through ſo ſtiff and cloſe a Paſſage, having an eaſy purling Deſcent the whole way between this Mountain and Town to the Sea. But 4. Allowing its Percolation, then the ſmall Range of little ſandy dry Mountains on the South of this Mer, are not ſufficient to afford half this large Reſervoir and Current of Water, with no other Supply but from thoſe little Hills which have their different Springs on their Path Sides, therefore a conſiderable Contribution there muſt be from this one Mountain, which is double the Bulk of all the reſt round this Lake. 5. This very Mountain empties ſeveral briſk Springs from its South Side into this Baſon, and their Water is neither Acid nor Petrefying; it is full of Flags, Ruſhes, Graſs, *&c.* and no Indications of Petrefying. The Mer is above a Quarter of a Mile long, and broader in ſome places than others; and ſuppoſing its Water were Acid, how is it poſſible that a Spring glutted and loaded with ſuch an alcaline Subſtance as Lime-ſtone Powder ſhould yet be capable of diſſolving Alum-ſtone; or if it did corrode the Alum-ſtone, what becomes of the Alum, for a thouſand Tun of the Spaw will not afford one Cryſtal of Alum? 6. And ſuppoſing the Water was or is of a petrefying Nature, what is that to the Drinkers; are not all Waters from Lime-ſtone or Iron-ſtone the ſame, *Bath*, *Briſtol*, *Buxton*, *Matlock*, *&c.* and even this favourite *Harrigate* Alum Well, which is a Chalybeate, has hundreds of Loads of Petrefactions or Concretions under and all round its Baſon? and muſt *Scarborough* only be poyſonous, and they wholeſome? Do not the numberleſs excellent Cures done by the *Bath* in many Ages proclaim the contrary, and prove it a kind and noble Gift of the wiſe and beneficent Author of Nature? But again, ſuppoſing them all petrefying Waters, who ever found Alum in Petrefactions. I never ſaw any Salt beſides Nitre, and ſometimes Vitriol in all thoſe I examined, which are not a few; nor did I ever ſee warm Waters, or any Waters in a briſk Motion, or with a full Quantity of Element, or in a great variety of different Mixtures, leave any Petrefaction, or tendency to it. *Knareſborough* dropping Well, which of all others is the moſt Lapideſcent, yet has no Petrefactions in its Current, but only when its Body of Water is broke, and ſome Drops falling or dribling ſlowly down, petrefies, and that in Winter only. But in the human Body there is Heat, a perpetual and briſk Motion, an Action of the Veſſels againſt the Fluids, a compound of ſundry Mixtures in the Blood, a Change of Nitrous Salt, and without Nitre no real Petrefactions, and Sea Salt is the only Salt that eſcapes unchanged in human Bodies, therefore Petrefactions from thoſe Waters cannot poſſibly happen in the Body.

I know the general Clamour and Outcry againſt theſe Waters by Chimiſts, was chiefly raiſed from their abounding ſo much with earthy Parts; theſe ſtopt in the ſecretory Ducts of the Kidneys and Liver, and ſo occaſioned Gravel, Stone and Jaundice: But they do not give us one Word of the Reaſon of this Stoppage, nor how to prevent it, if true, the Deſign being to find Fault right or wrong. It is undeniable that there are earthy Parts in the Blood, as alſo that theſe may occaſion ſtoney, chalky, or other Concretions in all parts of the Body where they ſtop and gather; but the Reaſons why they are more apt to ſtop in the Kidneys than other Parts are probably 1. From a lapidific Diſpoſition of the Body and Juices, whether hereditary or contracted.

Thus we ſee ſome particular Families and Conſtitutions are more liable to this Diſtemper than others. 2. The emulgent Arteries turn off from the *Aorta* directly at right Angles, and having only a little way to the Kidneys, they are immediately divided into innumerable Branches and Ramifications, and theſe have ſundry Turnings, Windings and Circumvolutions. Now the Blood ſent off by the Emulgents, is very different from that which keeps its ſtraight Courſe in the *Aorta*, the firſt containing the more watery, light and earthy Parts, whoſe Particles recede more from thoſe of a ſpheric Figure; for if we attend to Hydraulic Laws, we ſhall find that the more the Particles of any Liquor are moved in a Canal, and the more their Motion enclines to a ſtraight Line, the more ſolid and ſpheric are its Particles, but the more angular, light and improper, are thrown to the Sides, which is that part of the Blood thrown out into the Emulgents, whilſt the more Spheric and Globular keeps the Axis of the *Aorta*. 3. Add to the anatomical Structure of the Parts deſtined for the Secretion of Urine, for from the Pelvis of the Kidney to thoſe places where the Urine is immediately ſeparated from the Blood, we find them all that way conſiſt of little Bags, Papillæ and ſecretory Tubes, and probably the whole Texture of the Kidney conſiſts of ſuch; ſo that the Urine before it is propelled by the ſmall *Tubuli*, out of one *Follicle* into another to the *Pelvis*, meets with ſeveral ſtops and delays, beſides the Slowneſs of the Blood's Circulation here, beyond what it is either in the *Aorta*, or emulgent Arteries, for the Velocity of the Blood at the Orifice of the ſeparating Canal, being as the Number of Plications in the complicated Artery, the Viſcidity of the ſecerned Matter will be as the Number of Plications in the complicated Artery. 3. The more the Blood's Quantity is encreaſed, the more are the Veſſels diſtended, and the more they are dilated, the leſs is their elaſtick Force, and the larger the Secretion of the ſerous part of the Blood. Again, the ſudden decreaſed Quantity and Motion of Blood, ſtrengthens the Veſſels, leſſens the fluid Secretions, but encreaſes the more viſcid, therefore will the more ſerous Parts be firſt diſcharged by Urine, but the more groſs and earthy retained longer, and be caſt off afterwards by the Emulgents. This is plain from the Drinkers Urine, which at firſt is clear, and ſcarce ſmells or taſtes different from the Water, but afterward, is flaming high coloured and thicker. From this Reaſoning, ſuch as are liable to the Stone or Gravel, are directed to the following proper Helps; firſt, drink ſparingly of the Water, at firſt ſetting out eſpecially, ſo that the Veſſels not being too much dilated, its watery parts be not too much ſeparated and expelled before the Earthy, but both be gradually diſcharged together. 2. Since by many Experiments we ſee that Acids diſſolve the Precipitations of thoſe Waters, the Drinkers might uſe ſome proper Diuretic acid, as dulcified Spirit of Nitre. Or 3. Uſe ſuch Medicines as direct thoſe ſtagnant or viſcid Parts to the *Uropeia*, and invigorate the ſecreting Veſſels, and haſten the Expulſion of any foreign Matter lodged in them; ſuch are ſeveral of the natural Balſams, as Turpentine, Capivi, and Millepedes, or the gentle ſtimulating Salts, as of Amber, Tartar, *&c.* but eſpecially *Tinct. Cantharid.* which will ſweep the Kidneys of all Sludge. And a little Tincture of Rhubarb now and then will warm, ſtrengthen, and cleanſe the Inteſtines; but it is wrong to give *Tinctura Sacra*, for tho' it warm and ſtrengthen, yet it encourages the Piles, which all briſk purging Waters of themſelves are apt to do.

We have ſtill ſomewhat more to recommend repairing to this Spaw, and that is the Convenience of Bathing in the Sea. The Subject of cold Bathing cannot be better treated of than by Dr. *Wainwright* in his *Non-naturals*, and Sir *John Floyer* and Dr. *Baynard* in their Treatiſes of cold Bathing; the firſt gives us the Theory, the two laſt its Effects from much Obſervation and Experience; theſe Authors highly deſerve the Peruſal of all that regard their Health. The firſt tells us, that when the Mercury ſtands higheſt in the Barometer, our Bodies ſuſtain (ſuppoſing the Area of the Skin to be fifteen Feet) a weight of Air equal to 39900 Pound Troy-weight; but a Perſon two Foot under Water ſuſtains a Weight of Water added to that of Air, equal to 2280 ℔; for 2 the Number of cubical Feet of Water, is equal to $152 + 15$, the ſuppoſed Number of Square Feet on the Surface of the Body is $= 2280$ ℔ Troy. The Effects of this Preſſure are, 1. To ſtraiten the Veſſels and diſſolve the Humours. 2. To remove any viſcid Matter adhering to the Sides of the Veſſels. 3. To ſcour the Glands by fitting the Humours to paſs them and be evacuated, and to ſqueeze out any obſtructing Matter

ter that ſticks to the ſides of the Veſſels, and render the Motion of the Fluids more free and eaſy. 4. It mightily encreaſes the Quantity of Blood in the Brain and Viſcera; hence a greater Quantity of Spirits are generated and moved with greater celerity through the Nerves. 5. The Blood being thrown upon the *Viſcera*, occaſions a greater Quantity of Urine, *Bile*, *pancreatick* Juice, *&c.* to be ſeparated. 6. What hindered Secretion in the Reins, Liver, Spleen, Pancreas, Meſentery, *&c.* will be hereby removed, and Obſtructions cured, if not too chronic and obſtinate. On the firſt, ſecond and third of theſe Accounts it is, that cold Bathing cures Itch, Scurvy, Leproſy, Eelephantiaſis; it is from the third and fourth, that it cures Palſy, Madneſs, Melancholy, and the Bite of mad Dogs; from the fifth it cures Stone and Gravel. From the ſixth and reſt, it cures Cachexy, Jaundice and beginning Dropſy. It is from the Contraction cauſed, that it ſtops Hemorrhages, Gonorrhœa, Fluor albus, Frigidity, Infrequency and Impotency to Venery; hereby alſo it cures Rheumatiſm, Gout, Sciatica, Lameneſs, and a nervous Atrophy. As the cold Bath is moiſt, it ſoftens, relaxes, and makes all the parts of the Body pliable; hence a vaſt Quantity of perſpirable Matter is carried off. To theſe Diſeaſes *Floyer* and *Baynard* add œdematous and other Swellings, Rickets, hypochondriac Illneſs, frequent Colds catching, painleſs Inflammation of the Eyes, or other recent Inflammations on the Body, Menſes obſtructed, Sweat ſtopt, Spleen ſwelled or indurated; Puſtules on the Body from obſtructed Menſes, prevents hereditary Diſeaſes, cures Deafneſs, Lethargy, Faintings, Gripes, Cramps, Vomiting, Belching, want of Sleep, *Mala Stamina*, King's-Evil, Aſthma, Stiffneſs, Weakneſs, Blindneſs, Numbneſs of the Limbs, loſs of Taſte and Smell, cures Incontinence of Stool and Urine, *Hemiplegiæ*, loſs of Speech, Diſtortion of the Mouth, Weakneſs of the Muſcles, Tremors, Coagulations of the Blood, and blackneſs from Bruiſes, Falls, Blows, *&c.* Ephemera's, Hectics, Malignant Ulcers, Stranguary, Dyſury, Vertigo, Incubus, Convulſions, Opiates, Mandrakes, dimneſs of Sight, Excoriations; it prevents Fevers, feeds thin Bodies, gives Appetite and Digeſtion, cures Rheums of the Eyes, weak Eyes, with many more Diſeaſes. And the Rules to be obſerved in Bathing, and the Diſeaſes wherein it is hurtful, the Reader will find them at large. Now Sea Water containing much Salt (*viz.*

near one twentieth part) will give a greater Preſſure, a more ſenſible Stimulus, and ſtronger Contraction, therefore proportionably more prevalent in the above Caſes, and more certain Relief may be expected from it, as the Stimulus, Preſſure, and Contraction are ſo conſiderably greater, and the Water being liquid and moiſt, moiſtens the Skin after, relaxes it, enters the Pores, its Salt attenuates the viſcid, ſizy or ſtagnant Juices in the ſmall Veſſels of, and immediately under the Skin. But there is ſo much caution to be uſed in venturing on Bathing in the Sea, that it ought never to be done without good Advice, which I have no room for here, nor can any but thoſe preſent be competent Judges.

I made alſo the following Experiments on Sea Water; Solution of Silver turned it inſtantly milk white, but it preſently precipitated the Silver in a white Calx; with Solution of Sublimate it was a pale clear. Solution of Sugar of Lead changed it milk white; and a Precipitation followed. With Oil of Tartar and Spirit of Hartſhorn, it became white and crudled. I had a large Stone Bottle of Sea Water ſent me in *January*, it being kept a Month well corked, pitched, and a Bladder tied upon it, ſtunk not, but with Spirit of Hartſhorn turned of a fine tranſparent White, which ſoon loſt its Tranſparency and became thick, let fall a large white Sediment, which after four Days ſtanding loſt its Whiteneſs, turned clear, and all fine Cryſtals of Salt lying on the Bottom and Sides of the Glaſs Decanter. The Water poured off turned no more white with either Oil of Tartar or Spirits of Hartſhorn, nor afforded any Precipitation except with Solution of Silver. When the Sea Water had ſtood a Week, after opening (tho' I corked it cloſe again) it became intolerably fetid, nor turned it white with Spirit of Hartſhorn, as before; it weighed alſo 154 Grains in a Pint heavier than common Water, which had ſtood in a Lead Ciſtern four Days, that is, it weighed 34 Grains in a Pint heavier than when new taken up in Summer at a high Tide; and the common Water weighed eight Grains in a Pint heavier than diſtilled Water which had been kept ſix Months. ——A great part of the firſt Sediment, or Cryſtals, on pouring off the Sea Water, and adding diſtilled Water became Earth, and diſcovered a ſtrong hard petrefied Subſtance on the Bottom and Sides of the Glaſs. When this Water had continued ſix Weeks in the

Bottle, it ſtunk not much ſhort of *Harrigate* Sulphur Water, was of a deep greeniſh blue Colour. When this firſt white, then cryſtal-like Matter precipitated by Spirit of Hartſhorn, was waſhed out with the diſtilled Water, it appeared chiefly Earth, for after Filtration, that in the Cap being dried was very white, fermented ſtrongly with Acids, and was in all reſpects the ſame with the Earth obtained from the Spaw by Exhalation. The filtred Liquor being exhaled to a due Quantity, was very green, and ſet to cryſtalize, afforded only ſome ſmall cryſtals of marine Salt. A Quart of Sea Water exhaled, left of very white Salt twenty eight Penny-weight and a half, that is, one twentieth part ſhort of an Ounce and a half. So the Salt is to the Vehicle in this rainy Seaſon as 1 to $22\frac{1}{3}\frac{1}{4}$. Some of this Salt obtained by Exhalation, being diſſolved in diſtilled Water, changed not with Spirits of Hartſhorn or *Sal Volatile*, but continued ſtill clear, as at firſt, when the Air contained in the Lumps of Salt were got off. Hence 1. Both the Diſpoſition of Sea Water to ſuch intolerable Putrefaction, and its Salt fermenting with Acids, ſhew it to be highly Alcaline. 2. This great Diſpoſition to Putrefaction even in the coldeſt Seaſon, tho' thus plentifully loaded with Salt, ſhews the Neceſſity of Tides and Winds to keep its Motion, that it ſtagnate and putrify not. 3. Since ſo great a Body of Water as the Ocean is, could not poſſibly even by Tides and Winds (the firſt reaching only near the Coaſts, the laſt cauſing a Motion only on the Surface) be preſerved from Putrefaction without Salt; but we find by Experience, that the finned Tribes cannot live in any Water ſo highly impregnated with the other Salts, and alſo that Vitriol and Alum fertilize not the Earth, but impoveriſh the Soil, therefore it was abſolutely neceſſary, that it ſhould be this Salt and no other. 4. That ſince Spirits of Hartſhorn and *Sal Armoniac*, turn this Water firſt white, then cauſe a Precipitation, therefore it contains Nitre. 5. Since this Nitre exhales either by keeping the Water long, or on boiling the diſſolved and filtred Precipitation, and ſince the Marine Salt diſſolved in Water turns neither white nor precipitates with Spirit of Hartſhorn, therefore it is a volatile Nitre, which may either be neceſſary for preſerving the Inhabitants of the Ocean; or ſeveral other Purpoſes.

6. Since the fixed Salt of the Sea is to its Water as near as 1 to 22; then in Bathing, the Preſſure of the Sea Water upon the Bodies Surface will be the Twenty ſecond part greater than that of cold freſh Baths: and as the Preſſure is greater, ſo muſt likewiſe the *Stimulus* from the contained Salts, and Contraction from the Chillneſs of the Water. 7. Since the Particles of Nitre are ſo very ſmall and volatile, then in Bathing they are diſpoſed to enter the Pores of the Skin, mix with the *ſub-cuticular* Juices, and be of eminent Service in thinning and diſſolving thick or ſizy Juices, and be of no ſmall benefit in provoking Urine.

Of Malton-Spaw.

HAVING dwelt ſo long on *Scarborough* Spaw, a great Part of my Work on the reſt of this Claſs, will be thereby anticipated, they being all of the ſame Nature, and differing only in ſome Circumſtances, as to a greater or leſſer Impregnation with mineral Principles, or ſome Differences in the Kind, Proportion, Mixture, Volatility or Gravity of thoſe Parts. This Spring lies at the Weſt End of *New-Malton* Town, between the Road that goes from this to *York*, and the River *Darren*, about twenty five Yards North of the laſt, and between ſixty and ſeventy from the Road, under the Hill, whoſe perpendicular is about fourteen Yards. It is in a Cloſe belonging to the right honourable *Thomas* Lord *Malton*; the Hill above it conſiſts chiefly of white Free-Stone, and a baſtard Flint, till you come to a Place called *Broughton* a Mile and a half off, where is a Rock or a thick Bed of the richeſt Iron-ſtone in *Yorkſhire*, but lies neglected becauſe of the great Diſtance of the Place from *Coal.* This Spring riſes up into a Baſon, three Foot one third long, three Foot one ſixth wide, and three Foot deep. Its Walls leak the Water as it riſes, ſo that it ſeldom runs over any Quantity, therefore it is a Kind of ſtagnant Spring for tho' the Waters riſe up clear in the Bottom, yet from the Baſon being three or four Days in filling, the Water has loſt its mineral Spirit, is muddy, full of Ocre, and lies heavy on the Stomach. But empty the Receiver and drink the Water as it riſes up, it is clear, of a ferruginous Saltiſh Taſte, goes ſoon off the Stomach and Body, is of briſk Operation and more agreeable to the Appetite, its common Doſe being from three Pints to three Quarts, where the Stomach is palled and foul, the Water Vomits the firſt Day or two, having then cleared the firſt Paſſages it works its Way through Inteſtines and Kidneys, operates pleaſantly by Stool and Urine. The Authors that have tranſiently wrote on this Spaw, (as far as I find) are Doctor *Simpſon*, and Doctor *Liſter*, [a] I am informed that one *King* wrote on this Spaw only, in the Reign of King *James* the ſecond, but have not been able to procure it, nor do I find any Notice of it in the *Philoſophical Tranſactions*, or our Catalogues. Empty the Baſon, and the Water that ſprings up Weighs little heavier than common Water. It colours the Drinkers Fæces and Mouth a thorough black in little Time. It perfectly cured its preſent Keeper of an Aſthma and ſpitting of Blood, which ſhe had laboured under for five Years without the leaſt Relief, before ſhe came to it; ſhe was brought as low as was conſiſtent with Union of Soul and Body. It neither encreaſes by the greateſt Rains nor decreaſes by the longeſt Drought, it is always covered with a reddiſh Scum. Solution of Gold turned it of a whitiſh yellow, Solution of Silver Pearl with a browniſh Cloud in the Middle. Solution of Copper of a whitiſh blue. Tincture of Rhubarb of a very dark brown. Solution of ſublimate of a dark white, with a Pellicle. Solution of Sugar of Lead of a light white with a Pellicle, and much browniſh white Sediment. Oil of Tartar of a brown Colour above, and a pearl blue, then cruddled and let fall a Sediment. Spirits of Hartſhorn whitiſh; Spirits of Vitriol clear above, much yellow Precipitation under it, and below that at Bottom white cruddled Matter. Syrup of Violets turned it green with much Sediment. Tincture of red Roſes a deep blackiſh blue. Tincture of Red *Sanders* a pale white. Tincture of Fuſtic a very muddy yellow. Tincture of Braſil-wood, a muddy yellowiſh brown. Tincture of Logwood a Mazarine blue. Tincture of Galls firſt muddy white, then purple, then whitiſh purple, laſtly it cruddled and let fall a Sediment an Inch high in the ſmall Glaſs, with a beautiful tranſparent crimſon Colour above. Spirits of Hartſhorn added to this changed it to a fine green; this will cauſe this Water with Galls to precipitate preſently, and the Liquor will be a clear greeniſh Colour. Green Tea changed the Water purple with a very large Precipitation. Tincture of Sumac a tranſparent purpliſh blue with much black Sediment. *French* Brandy a blackiſh clear. Seven Pints of this Water exhaled, left of a reddiſh brown Sediment like Iron ruſt three Drams, and a half, two hundred and thirty Grains. When I had carried a Pint of this Water ſixteen Miles, *viz.* to *Scarborough*, let it ſtand all Night, and a Pint of the laſt taken up at nine a Clock at Night, corked well and let ſtand till next Morning, then compared the two. *Scarborough* Water with Solution of Gold was of a bright yellow, *Malton* of a darker yellow. Solution of Silver changed the firſt of a very clear white, with much Precipitation, the laſt of a blueiſh white, the Liquor cruddled and let fall ſome Sediment. With Tincture of Fuſtic the firſt was a tranſparent yellow, the laſt a cruddled dark yellow. With Solution of Sugar of Lead, the firſt cruddled and let fall much very white Sediment, the laſt much Sediment whitiſh brown. With Tincture of Braſil-Wood, the firſt was a light red, the laſt a deep Ocre Colour with much Sediment. With Tincture of Galls, the firſt was a yellowiſh brown at bottom, blue at top, much cruddling, and then a ſmall Sediment, the ſecond was a very deep crimſon, and one third of the Glaſs-full a purple coloured Sediment. With Tincture of green Tea, the firſt was only the Colour of the Tea, the laſt a deep purple with much Sediment. With the *French* Brandy the firſt was a blackiſh purple, the other darker. The Sediment of *Malton* Water was reddiſh, that of *Scarborough* white. When this Water which I carried from *Malton*, was ſet on the Fire to Boil, arrived to the greateſt Heat, and boiled ſixteen Minutes, yea two thirds exhaled, yet it ſtill ſtruck purple with Galls, Sumac or Tea. Yea when a Gill of it had ſtood ſixteen Days in an open quart Bottle, that ſtruck purple with Galls; nay the Sediment of this Water put into common Water warmed, when they had ſtood till the Earth was ſubſided and the Liquor perfectly cleared, the laſt ſtruck purple with Galls upon five Hours ſtanding. The Sediment of *Malton* Spaw fermented neither with Spirits of Vitriol, Sulphur, Hartſhorn, *Sal Armoniac*, nor *Sal Volatile oleoſum*. The ſeventh Infuſion of boiling Water poured upon this Sediment (when I had obtained all its ſeparable Salt from it) ſtill turned of a deep muddy purple with Tincture of Galls. Tincture of Galls changed the filtred Liquor to a deep mazarine blue, but it turned ſyrup of Violets neither green nor red, but left it a light muddy blue. The Water of the *Lixivium* exhaled, the Salt was of a grey Colour, the dried Earth was reddiſh like Sinoper; it ſmelled and taſted ſtill rank of Iron; Syrup of Violets in an Infuſion of this Earth in twenty four Hours became of a greeniſh blue; Galls changed another Part of this Infuſion to a deep bright Purple. The Salt neither fermented with Acids, nor Alcalis, but Spirit of Salt turned it green, the Load-ſtone attracted the calcined Earth briſkly. The Salt neither crackled nor flew about on a red hot Iron, but ſwelled huffed and burnt to a ſpongy dry Matter. Tincture of Galls put to a Solution of a very little of the Salt. the Liquor was of a fine deep mazarine blue, and precipitated a black Sediment, the Liquor above was blue. Some of this Salt kept cloſe corked up a year, then diſſolved in diſtilled Water half a Dram to three half Pints, after twenty four Hours ſtanding with the ſundry Mixtures, it was thus, with Solution of Silver, a dark Violet purple, with Tincture of Rhubarb a deep yellow; with Syrup of Spirits of Hartſhorn green and clear, with Syrup of Cloves blackiſh. With Tincture of Logwood bluiſh purple, no cruddling. With Tincture of Galls fine clear Violet purple. Solution of *Scarborough* Salt in diſtilled Water, with Tincture of Logwood was firſt red, then yellowiſh black. With Tincture of Galls was whitiſh; with Solution of Silver was a fine light purple red. With Tincture of Rhubarb was a light yellow, with Oil of Tartar clear, then let fall a downy Sediment, *&c.*

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[a] *Hydrologia Chimica*, p. 134, 135. This has the like Ingredients with *Scarborough* Spaw, and probably the ſame Operation. Its *Phænomena* with Galls, Oil of Tartar, Spirits of Hartſhorn and Vitriol are the ſame with the other. He diſtilled this Water in a Glaſs Retort with a gentle Heat, after the Water was come off, there remain'd a pale coloured Sediment, as in *Scarborough* Spaw, an eſurine aluminous Salt, which paſſing through or by ſome mineral Beds of Iron, licks upon it, and carries ſome ſmall Touches thereof, and alſo waſhing ſome Stones in its current raſes off ſome of them, which being wrought off by the eſurine Salt, it hides it with its ſelf in the Pores of the Water, and is what remains after the Salt is waſhed out of the Earth, has no Taſte nor is diſſolvable. In ſhort, to ſpeak of its Virtues and Uſe, is only to repeat what I have ſaid on *Scarborough*, they being in all Reſpects the ſame, only this is ſomewhat more ſluggiſh, and this may be helped by draining the reſtagnant Water, and improving it. Says *Liſter*, in the inky Spring near *Malton*, there is the ſame Lime-ſtone Salt as in *Scarborough*, this Water affords alſo Ocre of Lime-ſtone, and a little plumoſe Alum, the ſame Matter that may be extracted from burnt Sulphur, and the macerated Pyrites. From our Experiments we found it thus, *viz.* the Ocre falls firſt of all in the warm Water, then preſently Scales of Lime-ſtone ſubſide, and the Water boiled away to a very ſmall Quantity, you may with a Filtre ſeparate ſome Hairs like Plumoſe Alum; this is the genuine Product of the Pyrites, at laſt you have Cryſtals of Lime-ſtone, Nitre. If you are nonplus'd with a confuſed Mixture of ſmall Cryſtals, rub the Veſſel with a little Alum, and you ſhall have larger Cryſtals very beautiful, *&c.* p. 34, 35.

Under the Baſon, and betwixt it and the River is very much Clay, and between the Surface and fifteen Foot deep is a prodigious Quantity of the Selenites and Marcaſites of Iron (called there Cat Heads,) with ſome other Minerals which my Informer (the ingenious Mr. *Carr* of *Malton)* could not tell what to make of. It is called Selenites, not becauſe it reſembles the Moon either encreaſing, decreaſing, or at full; but being obverted to the Rays of the Moon in right Angles, it repreſents its Image in all its Phaſes, eſpecially at full, the ſame as a Glaſs Mirrour, and ſo it will do other Bodies; therefore it is more properly called the *Lapis Specularis.* Tho' there are ſundry Kinds of this Stone, yet ours has two of its ſides broader and more depreſſed, oppoſite to one another; with four leſſer Sides, ſo that its Hexangular, its thinneſt Sides are divided by a Ridge, the whole conſtitutes an inequilateral Parallelogram. It is no leſs beautiful than uſeful, for as it ſlits or cuts (like Cheeſe) into very fine thin *Laminæ* or Plates, ſo before the Invention of Glaſs, the Ancients uſed it for Lanterns and Windows; and both before and in *Pliny*'s Time Bee-hives were made of it, that the curious might ſee the Bees working their Combs and ſtoring up their Honey; it alſo ſerved for Mirrours; beſides a multitude of medicinal Uſes aſſigned it by *Galen*, *Cerutus* and *Aldrovandus.* The *Italians* at this Day calcine it, and make their curious Images, Fret-work, and beautiful counterfeit Tables, like Marble, inlaid with precious Stones, in the Forms of Animals and Plants; the Art of making which we have in *Kircher*'s *Mundus Subterraneus.* Such as want further Satisfaction about the Selenites may conſult the ingenious Doctor *Plots*'s Hiſtory of *Oxfordſhire* Ch. 5. Sect. 3. to 16. I ſhall only add that theſe Stones here bear an exact Reſemblance to the Cryſtals of the Salt of this Spaw, when obtained large from a good Quantity of the Salt cleared from its Earth.

From this ſhort Hiſtory we may gather 1. That it is ſurprizing to find this Spaw in no better Repair, lying ſo very near a large and ancient Borough Town, which ſends two Members to Parliment, has two Market Days Weekly, and has given the Title of Baron to ſo many noble Lords, both in the *Saxon* and *Norman* Times, and ſome tell us that this is the very *Camulodunum* of the *Romans.* 2. Since the Water of this Spaw is ſo very clear, ſparkling and ſpiritous at bottom, as it ſprings immediately up, ſits ſo light upon the drinkers Stomach, goes ſo readily and eaſily off the

Body, enlivens and ſtrengthens it ſo much, yet ſo muddy and unpleaſant to both Taſte, Sight and ſmell, lies heavy upon the Stomach, and goes off the Body ſlower when taken out of a full Baſon, this is ſufficient Evidence of the Inconvenience and Miſchief of too large, but eſpecially of a leaking Receptacle whereby the moſt volatile and efficacious Parts of the Water are loſt; the Vehicle too weak in this depauperated State to ſuſtain the fixt Parts which ſoon begin to precipitate and muddy the Water. All which may eaſily be prevented at the ſmall Expences of pulling down the old Well, cutting a Level from this to the River, laying down a ſmall Stone Baſon to receive the Water, which may not hold above two Gallons, for the ſmaller the Receiver, the better, lighter, more paſſable and medicinal is the Spring, and indeed conſidering its Slowneſs, and the Injury the open Air does the Water, the Baſon can ſcarce be too ſmall; the only Objection againſt this is, that if there were a Demand for the Water, the Baſon being ſo ſmall, much would be loſt, and a Supply could not be got. But this is eaſily anſwered by laying down a pretty large ſquare Trough, at the Side of the Receiver, and fitting a very cloſe Stone Cover to it, with a Ring and Staple in the Middle to lift it up by, and a little Guttur to take the Water from the Baſon, and another to diſcharge it by into the Level when the Trough is full. On the Top of the Hill above the Spaw, on the other ſide of the Highway is a very pleaſant, clear cold Spring, which at a little Charges might be turned to a cold Bath, or a River Bath might be made in the *Derwent* Side, by the End of the Level. 3. Tho' the Iron-ſtone, (which we imagine this Water to be highly impregnated with) lie at ſuch a Diſtance off, and the Spring has ſo long and perhaps a winding Courſe, yet ſince the Water riſes ſo ſpiritous and fine, hence ſee how well the Earth preſerves thoſe Waters, how little they ſuffer before they are expoſed to the Air, and how quickly they decay after. 4. Since this Spring has no Dependence on change of Weather nor Seaſons, it muſt lie a great Diſtance from the Surface or Day, it muſt alſo ſuffer no Alteration by Rains or Floods, nor can we ſuppoſe it weakened by any adventitious Mixture of other Springs, ſeeing it ſo ſlow and affords ſo little Water. 5. Since both its Sediment and Earth are ſo red, and ſtiptic to the Taſte, and the laſt ſo readily yields to the Atraction of the Load-ſtone, then 1. It ſeems chiefly to conſiſt of Ocre, and very little calcarious Earth. 2. Ocre being the greateſt Part of its

Earth, it ſeems to run through the Crannies of Stone, and not Sand, Clay or Gravel, of all which it contains ſo very little or none. 6. Since it is always covered with a thick ſtrong reddiſh Scum, and Solution of Silver gives it a browniſh Cloud or Tincture, and Solution of Sublimate a dark white, then we conclude it is not deſtitute of Sulphur. 7. Since it cruddles and precipitates with Oil of Tartar and Spirits of Hartſhorn, and this precipitated Matter gathered, diſſolved and filtred, then boiled to a *Lixivium*, ſet by to cryſtalize, it projects long hexagonal cryſtals, we ſay it contains a nitrous Salt. 8. This Waters precipitation with Spirit of Vitriol, Syrup of Cloves, Tincture of Fuſtic-wood, *&c.* are *Phænomena* peculiar to it ſelf, and incompatible with any other Waters I have tried in theſe Bounds, as alſo the Waters turning green with Spirits of Hartſhorn and Tincture of Galls. 9. Since this complex Sediment ferments neither with Spirits of Vitriol, nor Hartſhorn, nor Salt, and very little with Oil of Vitriol we ſee it is neither much alcaline nor acid, but neutral, which is the only Earth of this Kind we have found, 10. Since this Water weighs ſo light, as it ſprings freſh up, but much heavier when it has ſtood ſome time in the Baſon, or other Veſſel, we ſay it contains much mineral Spirit. 11. Since it ſtrikes inſtantly purple with Galls or other Aſtringents when freſh taken up, but very ſlowly afterwards, we conclude it contains volatile Vitriol. 12. But ſince Galls, green Tea, Sumac red Roſes, oak Leaves, *&c.* ſtrike the Water purple after it has ſtood ſo long expoſed to the Air, or when boiled; or an Infuſion of its Sediment, or a Solution of its Salt. And ſince we find vitriolic Cryſtals interſperſed with the nitrous, we ſay it alſo contains fixt Vitriol. 13. This affords us certain Marks whereby we know when a Water contains only a volatile, or a fixt Vitriol or both. For 1. The firſt loſes its tincturing Property with Galls, by being long expoſed to the Air in an open Veſſel, or on being warmed, but eſpecially if boiled. The laſt ſtrikes ſtill purple, after all theſe, yea, an Infuſion of its Sediment does it: But an Infuſion of the firſt ſtrikes not purple with Galls, this not being the Property either of Nitre, or any other mineral Salt beſides Vitriol. 2. The Liquor above the Precipitation of the firſt from Galls, is clear, but that on the laſt is a deep red, crimſon, mazarine or blue. 3. You ſhall never find vitriol cryſtals interſperſ'd with the Salts of the firſt; but if you exhale a Quantity large enough of the laſt you may procure them two or three different

ferent ways. 4. From this very Water obſerve we the following Miſtakes in Doctor *Liſter*, and the reſt of the late Writers who have all copied after him. 1. That no mineral Waters contain a fixt Vitriol, to maintain which Hypotheſis, and conceal the Truth, it would make one ſmile to ſee what a Shift he is put to; firſt that there was another Salt beſides Nitre, he could not avoid owning; but this muſt be a plumoſe Alum, becauſe he had before ſaid that Alum-ſtone diſſolves not, nor emits any of its Salt to common Water; therefore common Alum or Vitriol it muſt not be by any Means, but plumoſe Alum it ſhall be. 2. Sulphur Waters, ſays he, are from the ſlow Courſe and Stagnation of thoſe Waters, for were the Springs often kept upon the Pump they would not ſtink; but we ſee here a Water that's of a very weak ſlow Spring, long Courſe, a Stagnation of ſome Part for Months, yea whole Years, yet ſmells not. Therefore we muſt find ſome other Reaſons for their Fœtidneſs than theſe. 3. That the Salt of the Spaw is the ſame calcarious Salt with that of *Scarborough*, whereas *Scarborough* contains Nitre and marine Salt only and no Vitriol, this Nitre and Vitriol, but neither rock nor plumoſe Alum nor marine Salt: Again *Scarborough* Earth is chiefly calcarious, this chiefly Ocre. 15. Since ſeven Pints of this Water exhaled left ſeven eights of half an Ounce of Sediment, that is, one ſixteenth of an Ounce to a Pint, then the fixt Parts of this Water are to its Vehicle as 2 to 256. This ſeven eights of half an Ounce of Sediment affording one hundred and twelve Grains of Salt, then the Proportion the Earth bears to the Salt is as 51 to 49. But none of this Salt upon Cryſtalization affording either cubick Cryſtals, nor crackling on a hot Iron, nor inſtantly precipitating Solution of Silver, it contains no perceptible marine Salt. The Proportion of the Nitre in this Salt, is to the Vitriol as 9 to 1.

July 26, 1732, I exhaled two Gallons of *Malton* Spaw, had an Ounce of Sediment, which, diſſolved in Water, filtred and exhaled, left near half an Ounce of Salt which I divided equally, put a half of it in a Tea-cup, when diſſolved in Water, the other half being alſo diſſolved. I put in another Cup which I had rubbed hard ſeveral Minutes with a Piece of Alum, without breaking off any of it. I ſet both to cryſtalize, the Cryſtals were exactly the ſame being pure Nitre only, neither marine Salt, Alum, nor fixt Vitriol in them; neither a filtred Infuſion of this

Sediment, Salt nor Earth, would give the leaſt purple with Galls, *&c.* Hence 1. rubbing the Veſſel with Alum is a meer Jeſt, makes no Difference in Cryſtalization. 2. This Spaw contains not fixt Vitriol at all Times.

Since we find this Spaw contains a mineral Spirit, fixt and volatile Vitriol, Nitre and Sulphur, whereupon depends its many and great medicinal Intentions, I ſhall briefly give the Differences between it and *Scarborough*, which are chiefly theſe; 1. The laſt has leſs volatile, and no fixt Vitriol at all; the firſt has both. 2. The laſt has marine Salt; the firſt leſs or none. 3. The laſt has very little Ocre, and much calcarious Earth; this little or no calcarious Earth, ſince it ferments not with Acids, but very much Ocre. 4. *Scarborough* has more Salt than Earth; this more Earth than Salt. 5. This is a much ſlower Spring, and a far longer Courſe than *Scarborough*, whoſe impregnating Materials lie juſt at the Spring Head. 6. This affords a much leſs Quantity of Water than that, the firſt throwing up but about thirteen Gallons in an Hour, and the laſt one hundred and twenty Gallons. Therefore as the primary Intentions of *Scarborough*, beyond moſt other Waters, are againſt the Scurvy, Rheumatiſm, Hectic, Thirſt, recent and partial Inflammations, Diſeaſes of the Skin, Worms, Diſorders of the Stomach, Diſeaſes that are the Effects of Luxury and Intemperance, reducing groſs Bodies, removing habitual Coſtiveneſs, Heartburn, or wherever ſweetning and cooling the Blood and Humours, or purging the Body is indicated. So *Malton* Water is chiefly beneficial in the Hypo, beginning Dropſy, Jaundice, Aſthma, internal Ulcers, Hemorrhages or Weakneſs of the Veſſels, many and great Obſtructions in the Lungs, Liver, Spleen, Sweat bread, Meſentry, Uterus, or other Bowels of the Breaſt and Belly, a Relaxation, Weakneſs, Languidneſs, and Paleneſs of the Body; for it is certain that a ſtrong chalybeate Water that's laxative at the ſame Time is both an alterative and purgative, and therefore much preferable to thoſe that are only one of the two, becauſe it anſwers the Uſe of both chalybeate and purging Waters at once. It is certain there is no medicinal Waters in *England* ſtronger of the Minerals than this, nor have I ever ſeen any, whether imported foreign Water, or any of thoſe of our own Country near ſo ſtrong; being loaded even too much: Hence, were *Scarborough* and it mixt and drunk together, they would certainly anſwer a greater Variety of Caſes and Intentions, and be much more efficacious, than drank ſeparately. It would alſo be highly conducive to produce the Effects of other alterative Waters imported and ſold in the Shops, were this alſo mixt and drunk with them, as *German* Spaw, *Pyrmont*, *Holt*, &c. the laſt whereof contains only Nitre, and calcarious Earth, as I find upon ſtrict Examination of it. And it is a Wonder that we, who are ſo fond of importing other Waters, ſhould not export this, which will carry to the four remote Corners of the Earth without loſing its chalybeate Property. If the Fixedneſs of its Principles be objected to it, I would gladly know if they are more fixt than Salt, Tincture, Syrup, and Infuſion of Steel in Wine, or medicated Drinks made from Iron or its Crocus; theſe in many Caſes overheat the Body, rarefy the Blood, and do Miſchief; but here is a delicate fine Nitre to cool the Blood, prevent its Rarefaction, or other Harms that might happen. The Scum and Mud of this Spaw, wrought together and applied outwardly, cleanſe, dry and heal up old Ulcers, Scabs, or Tettars to a Wonder.

As to Directions for the Uſe of this Water, ſuch as have any Expectation to anſwer by it, or would indeed receive Benefit, ſhould obſerve a very ſtrict Regimen; they ſhould drink it more ſparingly than other Waters, as it is more loaded with the Minerals and may thereby pall the Stomach more; from three half Pints to three Pints may be a ſufficient Doſe here, except it's mixt with ſome fine common Spring Water, which it will bear with Advantage to lower it. Since it cleanſes the firſt Paſſages both upwards and downwards the firſt two or three Days eſpecially, it is its own beſt Preparative; nor ſhould it ever be drunk with *Glauber* or *Epſom* Salt, or cream Tartar, or other Purgatives, for theſe expell it out of the Body, and find it another Outlet than Nature intended it chiefly for, nor ſhould any fleſh Meat be allow'd with its Courſe, except thoſe of the eaſieſt and higheſt Digeſtion, and even theſe eaten ſparingly, as Rabbit, Veal, Chicken, Hens, Lamb, *&c.* but all kinds of Fiſh, Gooſe, Turky, Duck, ſalt Fleſh, Cheeſe, *&c.* are utterly inconſiſtent with the Deſign of the Water, the ſame are Ale, Spirits, Punch, Drams, *&c.* This Water requires more Exerciſe than any other of this Claſs, nor muſt the Exerciſe be violent. It ſhould be drunk in a Morning only, in ſmaller Doſes and longer Intervals than the laſt, in a Word there muſt be a ſtrict Obſervation of ſeaſonable Hours, Temperance, Exerciſe, ſuitable Meats and Drinks, *&c*, to reap the ſurprizingly great Benefits of this Spaw

Of Stenfield, Aſwarby, Walcote, Orſton, Ansby *and* Semperingham *Spaws.*

112. THE firſt of theſe lies ten Miles from *Grantham*, ten from *Stamford*, twenty three from *Lincoln*, five from *Faulkingham*, two from *Bourne*, and two from the Duke of *Lancaſter*'s Seat in *Lincolnſhire*, in a moſt fruitful and pleaſant Soil as is in *England*, upon a gentle Deſcent; within a quarter of a Mile of a large beautiful Grove of Wood, and two little Miles from the Marſh or Fenns, near two fine Pariſh-Churches, ſituate amidſt the richeſt Corn Fields, Meadows and Paſtures I ever ſaw, in a part of the Eſtate of Sir *John Heathcoate*, Baronet.

113. About forty Years ago, one *Robert Harwood*, wanting Water for the uſe of his Houſe, ſunk a Draw-Well before his Door, in a Puddle-Hole, where the Swine in very hot weather uſed to lie and wallow. As ſoon as he had built and finiſh'd his Well, in dedication of it to *Bacchus*, he made a good Brewing of ſtrong Ale. The Liquor, when drank prov'd a moſt ſtrong, eaſy, ſafe and pleaſant Purge. After this Diſcovery, the Country-people reſorted to it in great Companies every *Sunday*-morning all the Summer-Seaſon. About five Years after, it became more noted, and of late has got on the Wings of Fame, by the Recommendation chiefly of that ingenious Phyſician Dr *Ed. Greethead* of *Lincoln*, the great *Æſculapius* of the Country: For at that time there were no other Waters of that kind known in all thoſe Parts. And about five Years ago, the Proprietor of the Place and *Spaw*, built a ſmall Houſe for the Reception of a few Strangers, and a Cover over the *Spaw*, with a Lock upon it, with a ſhort Walk juſt by, boarded over, for three or four People to walk in when it rains. The Reſervoir to this Water is to this Day the ſame that was made at firſt for the Draw-Well, being nine Foot deep, four ſquare, two Foot and half wide on each ſide above; but lower down, it's a Circle, whoſe Diameter is three Foot and one Inch. The Water taken out of this full Reſervoir is very heavy, nauſeous-taſted, muddy, and full of Oker: But empty the Well, and take it up as it ſprings, it's very light, exceeding clear, a pleaſant taſted Vitriolic Water, full of Spirits. I cauſed the Well to be emptied, and went down to the bottom; where I found two Springs at near a Yard diſtance: One riſes from under the Stone-Wall at the South-ſide, and may be heard coming at a great diſtance under ground, riſing with a Sound exactly like two brace of Drums three hundred Yards off:

It boils up perpetually, and throws up thirty Gallons of Water in an hour. The other Spring runs from under the Wall on the North ſide, in a continued Stream, and caſts forth twelve Gallons of Water in an hour: They are both of the ſame kind; but the Laſt is the ſtrongeſt, being deeper colour'd, and lets fall a larger Precipitation with Galls: They, like other purging Waters, crudle Milk and Soap.

114. Solution of Silver turned the South Spring of a deep Pearl Blue, and let fall a ſmall Leaden-colour'd ſediment. That on the North ſide was the ſame. With Tincture of Verdigreaſe, both were firſt of a greeniſh Brown; then let fall a yellow ſediment: But that on the North ſide had the largeſt Precipitation. Tincture of Nephritic Wood changed the South Spring green, and let fall a ſmall ſediment. Both were yellow with Tincture of Rhubarb; But the laſt was deepeſt, which afterwards became a blackiſh Brown. Both were of a Pearl-colour, and let fall an Orange-colour'd ſediment with Solution of Sublimate. Solution of Sugar of Lead turned both white, and threw down much ſediment. Both were whitiſh with Spirit of Vitriol; but they let fall much ſediment, and became clear. The firſt Spring was all yellow; the Water of the laſt was greeniſh above, and yellow below. With Syrup of Violets, both were of a muddy Pearl; but the laſt turned to a greeniſh Yellow. They were much the ſame, with Syrup of Cloves. Both were white with Oil of Tartar, crudled, and let fall much ſediment: That of the laſt was double that of the firſt. Both were white with Spirit of Hartſhorn. Tincture of Fuſtic turned them of a muddy Yellow; the laſt was deepeſt. Tincture of Logwood changed the firſt of a deep Blue, with much ſediment; the laſt, of a greeniſh Blue, with more ſediment. Tinctures of Galls and *Sumach* made the deepeſt and fineſt Purple with the firſt; but the laſt was of a very deep Peas-bloom, and had much ſediment.

When a Pint of this Spaw had ſtood twelve Hours in an open Pot, and ten Drops of Tincture of Galls put to a Glaſs of it, it was firſt of a deep Rasberry, then purple Red, then a wholly opaque Peas-bloom, and ſo let fall much ſediment. The very ſame it did when freſh taken up. Nay, when a Gill of it had ſtood in my Lodging Room in a Pint-Mug two Nights and a Day and a half, one Grain of Powder of Galls ſtruck it firſt of a tranſparent pale Purple; then deeper; then it crudled, and was perfectly an opaque Peas-bloom Colour. When it had thrown down its ſediment, and become intirely clear and fine above, I poured off this clear upon freſh Galls; but it would no longer ſtrike the leaſt Purple. When this Water had ſtood expoſed two Days and two Nights, it weighed no heavier than when juſt taken out of the full Baſon. Some of it taken up ſcalding hot, juſt at the boyling, tinged as deep as ever with the ſame Number of Drops of Tincture of Galls, in the ſame quantity of Water. The Water taken freſh up, began to crudle with Tincture of Galls in twenty Minutes, and let fall its whole Sediment in ſix Hours. That which had ſtood all Night open, crudled with Galls in ſix Minutes. That taken up ſcalding-hot, crudled inſtantly, and let fall its Sediment in twenty Minutes. Oil of Tartar and Spirit of Vitriol both chang'd the ſcalding Water to a deep Pearl and Opaque: It ſparkled and fermented much with the laſt: Both let fall a large, browniſh, white Sediment in five Hours. The Liquor above was clear; but the laſt had moſt Sediment; nor could it be waſh'd off from the Glaſs-ſides without Salt.

This Water taken up clear, turn'd whitiſh by ſtanding, and caſt up a ſtrong, variegated Pellicle. When put on the Fire to boil, it firſt threw up a very thick Froth all over its ſurface, like a Barber's Lather, then a thin Oker-Sum. After three minutes boiling over a great Fire of Wood, it ſtruck purple, with Galls, and inſtantly precipitated. Upon long boiling, it turn'd all of a deep brown, or Oker-Colour, and thick. A large Phial-Bottle filled a third part full of this Water freſh from the Spring, and ſet in the Pan of cold Water, when the laſt began to boil, the Phial threw out its Cork with great Violence. and a prodigious Crack. When ſixteen Quarts of this Water was boil'd away to eight, neither that in the Pan, nor Phial ſtruck any longer Purple with Galls; but was of a whitiſh Clay-colour; and when it had ſtood eight Hours, it was green throughout.

When I had tried this Water out of the full Baſon, with the colouring Ingredients, and let them ſtand four Hours, with Tinctures of Verdigreaſe and nephritic Wood, it had precipitated much greeniſh Sediment. With Tincture of Rhubarb it was firſt yellow, then muddy, then blackiſh brown: Laſtly, it crudled and precipitated. With Solution of Sublimate, it was firſt browniſh white, then a whitiſh yellow, then yellow. With Solution of Sugar of Lead it's white and thick, then throws down a white Sediment, and leaves a clear Liquor. With Oil of Tartar and Spirit of Hartſhorn, Tinctures of Gall and Sumach, as above. With Syrup of Cloves, of a dark Green. With Syrup of Violets, firſt muddy, then green. With Spirit of Vitriol, a ſtrong Fermentation. With Tincture of *Braſil*, firſt reddiſh; but it quite faded and turn'd muddy, like Clay-water. With Tincture of Logwood it was of an opaque Mazarine blue; but it ſoon crudled and let fall much black Sediment.

Six Ale-Gallons of this Water exhaled, left three Ounces, two Drams and four Grains of Sediment, which fermented prodigiouſly with Spirits of Vitriol, Salt and Sulphur, or Oil of Vitriol. Several Waters poured on this Sediment, and let ſtand till they were clear, and that poured off and filtred, till there remain'd no more Salt in it to be diſſolv'd; then the Earth dried, and the filtred *Lixivium* exhaled till the Water was gone, and Salt only left: The firſt weigh'd one Ounce ſeven Drams; the laſt was one Ounce three Drams; the four Grains were loſt, tho' the filtring Cape was a very thick Paper, and carefully dried, and weighed both before and after. So that the Proportion of the Earth to the Salt is as fifteen to eleven; the Proportion of the Sediment to the Vehicle is as One to 236^{4}_{3}. Tho' this Spring at bottom throws forth Forty two Gallons of Water in an Hour; yet when the Well is full, I doubt whether it runs over ſix Gallons in 24 Hours, ſo leaking is the Wall. It's a ſhame that more care is not taken of ſo valuable a *Spaw*; eſpecially when advertiz'd of the Miſchief and Inconvenience of ſo great a Receptacle Nature gives us a fine, clear, neat, light, ſpirituous, invigorating Medicine; but thro' Covetouſneſs, Mankind muſt drink a heavy, thick, muddy, ſpiritleſs, ſtagnant ſtuff; and if they are not better, the Water muſt bear the blame; when it's great odds but the Cauſe lies in the Love of Pelf, that a little Money cannot be ſpared to make a Level for the bottom of this Well, and a ſmall Baſon laid down to contain about three Gallons of Water. This Salt diſſolved again, and ſet to cryſtallize, was of a whitiſh yellow Colour, afforded very large Cryſtals of Nitre, and much marine Salt, which cryſtallizes not for a Month after the other: The firſt is to the laſt, as five or ſix to one. The above Experiments were made in *April*, tho' all Springs were at that time very low, being a great Drought. But *September* 3, following I tryed it again: It was a dark, browniſh yellow, with Tincture of Rhubarb; very muddy with Solution of Sublimate; the ſame as before with Solution of Sugar of Lead; pale blue with Syrup of Cloves; bluiſh with Syrup of Violets; very deep Peas-bloom with Tincture of Galls; pale Peas-bloom with Tincture of Sumach. A Gallon of it exhaled now, left only ſeven Scruples and fifteen Grains of Sediment. Thus we ſee a conſiderable Alteration on Waters from the Seaſons. A Bottle of the Water brought home with me, and let ſtand a Week, did not ſtrike Purple with Galls. This Well is cover'd with a red ſcum; much Oker lies in its Bottom and Walls, wherein is Sulphur. The Earth of this *Spaw*, or Oker calcined, is briskly attracted by the

the Loadſtone; and uncalcin'd, huffs, ſwells and ſmoaks with the Acid Spirits, and turns of a beautiful light Yellow with Spirit of Vitriol.

115. From the whole of thoſe Experiments, we ſee, this Water contains a very rich Mineral Spirit, at bottom, ſome Sulphur, much Volatile, but no fixt Vitriol, about one 4th Okrous Earth, and the reſt Calcarious Nitre, and Marine Salt. The Hiſtory of the *Band*-Well and Bath here, I gave in Part the Firſt, among the petrefying Waters.

116. Eight Miles from *Stenfield*, three from *Faulkingham*, ſeven from *Grantham*, fifteen from *Lincoln*, ſixteen from *Newark*, lies *Aſwarby*; a quarter of a Mile on the South ſide of which, on the North ſide of an eaſy Aſcent, on the left hand, on the Road-ſide from this to *Faulkingham*, riſes up *Aſwarby-Spaw*, which had ſome Ages paſt been of good Account; but having a very large Receiver, a poor Widow-woman's Cow going to drink of it, fell in, and was drown'd. This ſmall Loſs, joyned with the Ignorance of the Times, Peoples Inacquaintance with the Excellency and extenſive Uſefulneſs of ſuch a noble Remedy, occaſion'd its being fill'd up, whereby it was loſt for ſome Ages; only a reputed Fabulous Report was handed down without any Knowledge or Remembrance of the Place, till the Year 1731, one Mr. *Hall*, the Schoolmaſter of *Ansby*, diſcover'd it again. Then it was quickly frequented with vaſt Crowds of People from the Neighbourhood around, had great ſucceſs in ſeveral Diſorders; being a very gentle Laxative, it operated pleaſantly, without griping Pains, Faintneſs, Confinement, or ſcalding Heat in the *Anus* (which all Waters impregnated with Marine Salt do.) It raiſed their Spirits, ſtrengthened their Bodies, gave a moſt voracious Appetite, and ſtrong Digeſtion. This invited the Lord of the Mannor, that truly honourable, vertuous, humane and ingenious Gentleman, Sir *Fr. Whichcote*, to try the Waters himſelf. He not only found, it anſwer'd all, but much exceeded the great Character he had heard of it. Then he ſet Labourers on to clear the Ditch in which it riſes; in digging whereof they found the Wall of the old Recevoir (which was very large and wide) and prepar'd the Place for a new and proper Baſon; at which time I happen'd to be preſent. This, and the Ground about it, is a ſtiff, ſtrong Clay, under which is a Mountain of rich Iron-Stone, that in breaking gliſters like wrought Iron, but ſo loaded with Sulpher, that wherever the Water makes any ſtop under Ground, the Earth turns ſhining black; the Water above Ground

leaves great Heaps of reddiſh brown Sludge, or Oker. On the other, or North ſide of the Town, under the Corn-mould, is Lime-ſtone, and plenty of fine petrefy'd Shells.

117. When I examin'd this Water in this poor low condition, *Apr.* 27, and 28, 1732, the Water, when in the Baſon, or freſh taken up, is a very fine bluiſh Clear; but when it has ſtood ſome Hours, it turned muddy, and full of reddiſh Flakes of Oker. It has a ſtrong Irony Taſte and Smell, together with a grateful ſweetneſs. It had then a double Ciſtern made for it, the firſt and largeſt whereof contains about 17 ſquare Inches of Water, is fitted with a very ſtrong cloſe Cover, and lock'd up: The leſſer is open, and contains only about 8 Inches every way, to prevent Peoples waſhing or bathing in it. It's ſupply'd by an Iron Pipe out of the ſurface of the larger Receiver. When I ſaw it, whilſt they were repairing theſe Baſons, it threw forth thirty nine Gallons and one tenth of Water in an Hour: Now I am inform'd, that it ſends out only twelve Gallons in an Hour; but the reſt may eaſily be recover'd upon occaſion.

118. Solution of Silver turns this Water firſt white, then Pearl; laſtly, of a ſlight Sky-blue. Solution of Verdigreaſe in Water makes it firſt whitiſh, then greeniſh, full of yellow Clouds and ſediment. With Tincture of Nephritic Wood it's firſt whitiſh, then crudles, and lets fall a dark whitiſh ſediment. With Tincture of Rhubarb it's firſt a very bright Yellow, then a dark yellowiſh brown. With Solution of *Sublimate* it's firſt whitiſh, then a dark white. With Solution of Sugar of Lead it's Milk-white, crudles, and lets fall a large white ſediment. With Oil of Tartar it's firſt a pale white, then bluiſh white. The ſame it was with Spirit of Hartſhorn, only the ſediment was larger. The acid Spirits made even that which had ſtood ſome time, perfectly clear. With Syrup of Cloves it was a dark blue. With Syrup of Violets, firſt bluiſh, then very green. With Tincture of Logwood it was a beautiful Mazarine-blue. With Tincture of Galls it inſtantly gave a charming Peas-bloom Purple, then it crudled, and precipitated one Eighth of the Glaſs-full of ſediment, the Liquor above being of a clear fine Purple. With Tincture of Sumach it was of a very deep tranſparent Peas bloom, and no ſudden Precipitation.

I took three large Water-Glaſſes of near a Pint apiece, put ten Drops of Tincture of Galls into each of them; then filled up the firſt with *Aſwarby Spaw*-water, the ſecond with *Walcote Spaw*, the third with *Sempeningham-Spaw*, let them all ſtand nineteen Hours.

The firſt let fall four times the quantity of Sediment of either of the other two, of a deep Peas-bloom below, a dun Stone-colour above; the Water upon it was of a whitiſh Clear. The other two had near a like Sediment; that is, each of them about a quarter of the firſt, the Colour of *Balauſtian* Flowers, very beautiful. More of thoſe three Waters put into Phial-Glaſſes, then hard corked, and ſet in a Pan of Water till it boiled, then taken out, and poured on Powder of Galls; thus ſtruck no Purple: But next Morning the firſt was of a deep Green throughout. This Water kept till it was a little fetid; Solution of Silver turned it inſtantly black, and threw up a Pellicle on the top, like a thick Cobweb. Solution of Sugar of Lead turned it alſo black. That Water which was taken up ten weeks, and was but indifferently corked, ſtruck inſtantly Purple with Tincture of Galls, and a deep dark Yellow with Tincture of Rhubarb, and a deep muddy Blue with Tincture of Logwood. The Cover of the Ciſtern lifted up, the Water gave a little fetid ſmell; the Baſons and Frame were covered with a very thick ſcum, below which was much Oker. Ten quarts of *Aſwarby*-water exhaled, left near ten Drams of Sediment (juſt like reddiſh Iron-Ruſt,) that is, a Dram to a Quart: Thus the Sediment is to the Water, as One to 256. This Sediment, when diſſolved in common water, gave a very uncommon and ſurpriſing *Phænomenon*, which I never met with before, *viz.* it turned the cold water and large Chocolate-Cup very warm; the Salt diſſolved, filtred and ſeparated from the Earth: The laſt weighed four Drams and a half of a fine purple Colour. This Earth calcin'd in a ſtrong Furnace, much of it was attracted by the Loadſtone; but its whiteſt part was not affected by it. Both this Earth and Sediment fermented violently with the Acid Spirits, but not its Salt: ſeeing this Spring, before its Baſon was laid down, ſent forth about thirty nine Gallons and a Pint of Water in an Hour; then it ſent out nineteen Ounces and a half and half a Dram of Sediment in that time: But allowing this Spring to ſend forth the like quantity of Water the Year round (which I believe true, from my Obſervations upon it in *April* and *September*,) then it affords nine hundred and thirty nine Gallons of Water in twenty four Hours, which contains four hundred and ſixty nine Ounces and a half of Sediment, whereof two hundred and ſixty three Ounces is Salt, and two hundred and ſeventeen Ounces of Earth; ſo that the Salt is to the Earth, as Eleven to Nine.

119. That the Vitriol and Sulphur in thoſe Waters are from the Iron-ſtone, as well as the Oker, is undeniable; ſince Rain, Miſt, Dew, nay, the common Air it ſelf, corrode, ruſt and diſſolve Iron, when ſeparated from its groſs Glebe of Earth, and refin'd: Therefore wherever we meet with Vitriol, we may reaſonably expect Sulphur in the ſame Liquor, Iron-ſtone containing one as well as the other, and being equally diſſolved by the Water in the Corroſion of the Stone. Nor is there any other Metal diſſolvable by Water, except Copper: The difference between which ſolutions in Water is, the firſt is exceedingly ſtomachic, exhilerating and ſtrenthening; the laſt is nauſeous to the Taſte, irritates the Stomach, gripes the Inteſtines, inverts the periſtaltic Motion of both, and cauſes terrible, painful and inflammatory Vomitings. The Vitriol of the firſt is green, that of the laſt is blue. Whatever Writers on this ſubject may advance, to puzzle and perplex both themſelves and Readers; yet we are to look for none of the other Metals diſſolved in, or by Water: For Gold is, 1. The moſt denſe and ſimple of all natural Bodies, of a moſt compact ſubſtance, and freeſt from Salt, Sulphur or Mercury. 2. Of all others, it's the moſt fix'd both in the Air and Fire, ſince one Ounce of it will continue two Months uncorrupted, and without loſs of one Grain in a Glaſs-Furnace. 3. It's only diſſolvable by the Preparations of Marine Salt; but this Salt being never naturally of ſo great Subtility, Penetrability and Corroſiveneſs, to alter the *Compages* of Gold; and neither this Salt nor its Spirits exiſting in the Atmoſphere, therefore this Metal never ruſts. Silver alſo is incommiſcible with our Waters: For it's of ſo fixt a nature, even in the Fire, that it's little ſhort of Gold, and contains ſo few of thoſe things that are diſſolvable in Water, and corroſive of its own ſubſtance. It's moreover, both hard and compact in its natural ſtate, before it's refin'd. Nor are we to find Quickſilver in them: For beſides, its being ſo ponderous, it's ſo very ſimple, and free from thoſe Salts, which diſſolving in Water, abode ſome part of thoſe Metals wherein they are moſt prevalent; and laſtly, its Inſociability with Iron and Copper. Lead, from its Hardneſs and Compactneſs in a natural ſtate, the Inſolubility of its *Nexus*, and Indiſſolubility of its Parts in Water, the ſweetneſs of its Salt, incapacity of ſolution from common Salt, do all make it ſafe for mixing with common Water, whilſt in a natural ſtate; tho' of moſt other Metals, ſooneſt corroded by Acids when refin'd. Tho' Tin be the moſt ſpongy, fuſible, light, ſoft, and incompact of all; yet it impregnates not our Waters: For 1. Tho' we have ſuch

plenty of it in ***Britain***, that ſeveral Learned Men think our Country derives its Name from it; yet we find no mineral Waters in thoſe places where it's in greateſt plenty, but what are impregnated with the ſame Principles only, as we find in Waters where there is no Tin. 2. Tho' this Metal does contain a Salt, yet it's of ſo ſweet a Taſte and inactive a Nature, as is not capable to corrode any part of its Metal. Hence we ſee, theſe Metals are not to be diſſolved in their Mines; becauſe their diſſolving *Menſtrua*, *viz.* the Acid of Nitre and Spirit of Sea-ſalt are not to be met with in the Mines. Therefore Gold, Silver, Mercury, Lead and Tin are neither to be ſound in their diſſolved nor again concreted Juices The ſemi-Metals are Vitriol, *viz.* of Iron and Copper chiefly: Theſe are ſaid to be the natural acid wandring Salt coyned to a metallic Glebe. 2. Native Cinnabar, which is made up of Sulphur and Mercury: But this being the Effect of Fuſion in ſubterranean Fires, can only be where there are *Volcano's* (as is generally believed, tho' I have reaſon for the contrary;) but we having none of thoſe, our Waters are free. 3. Antimony, a mere Compound of foſſile Sulphur and Metal, therefore not commiſcible with Water. Biſmuth and Zint are like Antimony; the firſt conſiſts of Lays and Scales, is white like Silver, harder than Antimony, but leſs friable, therefore leſs diſſolvable. Zint is yet more compact and leſs diſſolvable. The lower and more improper Claſs of ſemi-Metals are all foſſile cryſtalline Bodies, ſtonous or earthy, all containing ſome ſort of Metal in ſmall proportion, as the *Armenian-*ſtone, Eagle-ſtone, Blood-ſtone, Loadſtone, *Lapis Lazuli*, Okers, &c. Theſe Chalybeate Waters, of all Salts contain the moſt Nitre, which of it ſelf is neither Acid nor Alcaline, nor inflammable, is of a wonderful cooling, attenuating nature, reſtores and maintains the red Colour of the Blood, as is evident from Experiment; preſerves both the ſolid and fluid parts of Animal Bodies from Putrefaction: Therefore in all inflammatory Diſeaſes from a phlogiſtic Thickneſs of the Blood, it's, of all others, the moſt attenuating Salt, is wholly incapable of Miſchief, either from its weight or Acrimony, excites not much Thirſt, infallibly and pleaſantly prevents the Alcaleſcence of humane Salts and Putrefaction of their Oil. But for all this, it continues not unchangeable in the Body, like marine Salt; but in time degenerates into the nature of Animal Salts. It's from the former Properties of Nitre, that purging Nitrous Waters, as *Scarburgh*, freed from their Vitriol, are ſo wonderful a Remedy in Hectics, being drunk in ſo ſmall a quantity as not to purge. As to the wandring acid, foſſile Salt, volatile and liquid, ſaid to be met with in all Mines, which uniting with foſſile Oil, *Petrelæum*, or the like, conſtitutes ſundry native, foſſile, pethioid *Sulphurs*, called *Vive*; and alſo unites with ſemi-Metals, as Cinabar, Antimony and other Foſſils, as well fluid as ſolid. I ſhall not pretend to deſcribe its Properties, Vertues and Cryſtals, till I can once find it brought under my outward ſenſes, and ſo made liable to Examination: And this being *Simpſon*'s *Eſurine Salt*, exiſting every where, and even, by his own words, partaking as yet of no quality, and ſo incognoſcible, I ſhall take it for *gratis dictum*; tho' *Boerhaave* and the Chymiſts will have it, with Metals to compoſe ſundry *Calcantha* with calcarious Earths, ſeveral Alums, and with *Pyritis* the Mother of Vitriol; and burnt by a vegetative Fire, it produces common Sulphur, and is very like that which burning Sulphur produces, a ſmoke with a blue ſuffocating flame, fatal to all Animals. By which he deſcribes us a kind of Sulphur inſtead of a Salt; and tells us, that the *Analyſis* and Reſolution of it and Sulphur are the ſame.

120. *Orſton Spaw.* I cannot find when, or by whom the Diſcovery of this Water was firſt made: But its ſingular good Effects in various Caſes, as the Hyppo, Scurvy, Inappetency, Indigeſtion, Pain of the ſtomach, Coſtiveneſs, ſtoppage of Urine from Sand, Gravel, or Sludge in the Urinary Paſſages, Foulneſs of the Body, beginning Obſtructions of the Liver, Spleen, and other *Viſcera*, Ulcers of the Lungs or *Hemoptre*, has juſtly intitled it to the firſt Character of the Mineral Waters in *Nottinghamſhire*; and the due and neceſſary Care taken about the Spring, will compleat its Uſefulneſs to Mankind. It's about ten Miles from *Nottingham*, three or four from *Newark*, and four from *Beavoir* Caſtle. It riſes up perpendicularly into a Baſon, out of a ſtiff Clayie ſoil, upon a gentle Deſcent. It had too large a Receptacle when I ſaw it, whereby the Water weighed ten Grains in a Pint heavier at its ſurface than bottom; the firſt alſo ſtruck a pale Purple with Tincture of Galls, and precipitated its Oker in an Hours time; with Tincture of Logwood it was only muddy; but at bottom, the ſame number of Drops of Tincture of Galls ſtruck an opaque beautiful Violet; and with Tincture of Logwood, a pale Blue. The Taſte of the Water on the ſurface was diſagreeable, rough and harſh, inclining to that of ; but at bottom, it was of a delicious, gentle, rough, ſweetiſh Chalybeate-taſte. This Recevoir is now taken down, a Level made, and a ſmall Baſon laid down, whereby the Water in the Baſon preſerves its volatile Parts whilſt full.

The bottom of the *Spaw* was heaped with ſhining black Sludge, ſome of which dried, and laid on a red-hot Iron, in a very dark place, ſparkled, ſtunk, and threw out a bluiſh Flame. The top of the Water was cover'd with a thick ſcum; it crudled *Soap*. There was a very little Oker in the ſtream, but much ſtinking black Sludge, which ſmelt ſtrong of Sulphur. The under-ſides of the Stones lying in the Well, were Ink-black, and ſtunk much. With Solution of Silver this Water was a whitiſh Clear; next Morning it was clear, with a ſmall white Precipitation; with Tincture of Verdigreaſe, whitiſh brown, and crudled; with Tincture of Nephritic Wood, firſt a whitiſh Clear, then clear, with a yellowiſh brown Precipitation; with Tincture of Rhubarb, firſt blackiſh Yellow, then very dark muddy Brown; with Solution of Sublimate, firſt muddy white, then let fall a ſmall Precipitation; with Solution of Sugar of Lead, firſt a dark Pearl, then clear, with a ſmall white Precipitation; with Oil of Tartar, firſt whitiſh, then crudled, and let fall much ſediment, and clear above; With Spirit of Vitriol, a whitiſh Clear; with Spirit of Hartſhorn, firſt whitiſh, then a large Precipitation of a yellowiſh brown Colour, and Liquor above clear; with Spirits of Salt, very clear; with Syrup of Cloves, firſt muddy, then a dark Green, then a very fine Green; with Syrup of Violets, firſt greeniſh, then a pale muddy Green; with Tincture of Logwood, firſt a light Blue, then clear, with a blackiſh green ſediment; with Tincture of Galls, a Violet-Purple precipitated the Glaſs half full: The next Day the Liquor was clear at top, with a very large deep blue ſediment; with Tincture of *Sumach*, a light Purple with a ſmall ſediment. I took up a Bottle of this Water when the Receptacle was full; another when it was emptied, took both to *R. Thoroton*'s at *Streaton*, Eſq; let both ſtand all Night; the firſt weighed twenty four Grains heavier than at the Spring, the laſt thirty Grains in a Pint: Nor wou'd the firſt ſtrike the leaſt Purple with Galls; but the laſt ſtruck as deep a Purple, as when immediately ſprung up. Two Water-Glaſſes filled with this Water, one out of each Bottle, poured out, and let ſtand open all Night, next Morning the laſt taken up, had no ſediment, but was of a pale whitiſh Colour; and with Tincture of Galls ſtruck as deep a Purple as ever. The firſt had let fall much Oker, quite loſt its Chalybeate Taſte, and ſtruck not the leaſt viſible Purple with Galls. This Baſon was not only too large, but was full expoſed to the Meridian and weſtern Sun. See here again, what Miſchief a Large Baſon does the Water: But this is removed, and all poſſible care taken to preſerve the Efficacy of this Water in all its parts, by that moſt ingenious worthy Gentleman *Robert Thoroton*, Eſq; who accompanied me himſelf, and was witneſs to my whole Proceſs of Experiments, was readily convinced upon evident Demonſtration, and ſet himſelf immediately to remedy this Inconvenience, and make it more uſeful, tho' not in his Eſtate, but in the Duke of *Kingſton*'s purely from that noble Principle of Philanthropy, whereof he has ſo large a ſhare. Forty eight Pints of this Water exhaled, left of a reddiſh brown ſediment one Ounce and ſeven tenths, or thirty two Peny-weight; that is, 16 Grains to a Pint; ſo that the Sediment is to the Vehicle, near as 1 to 512. Nine Peny-weight of this Sediment afforded two Peny-weight and one fourth of Salt, which was wholly Nitre; ſo that the Earth of this Water is to its Salt, as 27 to 9, or $13\frac{1}{2}$ to $4\frac{1}{2}$. This Water is replete with a Mineral Spirit to a Prodigy: When freſh poured out into a Glaſs, it ſparkles and flies and makes the Drinker's Head very giddy. The Water purges People of a groſs bulky Habit, gently moves the Body of others, makes the Tongue, Throat and Feces of the Drinkers perfectly black. Its other Principles are, Sulphur, Oker and Niter, with ſome calcarious Earth.

121. Nor can I here wholly omit the common Waters about *Streveton* or *Streaton, Carcolſton* and *Flinham*: All their Grounds abound with Sulphur; and the Sludge under the ſtagnant Waters is black, ſtinks, and gives full Proof of Plenty of Sulphur. Many of their ſmall Springs emit a ſenſible ſulphureous ſmell. On the North ſide of *Cartolſtone*, near adjoining to *Streaton*, is a ſmall Spring with a little ſulphurous ſmell, which precipitates Solution of Silver inſtantly. This laſt diſcharging it ſelf into a number of ſmall Springs, and theſe into a little Brook, called *Cardyke*, the Water whereof is uſed in Brewing, makes the Table-Beer a pleaſant gentle Cathartic, and lines the Stream of the Brook with black ſulphurous Sludge. This Beer taſtes Winey, ſparkles, and is like rich *Champaigne*.

122. Two Miles from *Faulkingham*, and two from *Aſwarby*, is the antient Monaſtery, or Priory of *Semperingham*, or the Order of *St. Gilbert*, built in the 12th Century, by *Gilbert de Gaunt*. From under the South-weſt Corner of its Foundation, riſes up into a ſmall Baſon, a fine light Chalybeate Water, called *Semperingham-Spaw*; which, tho' clear and pleaſant, yet is ſo much weaker of both purging Salt, and volatile Vitriol, that it's much ſhort of *Stenfield* and *Aſwarby*, whereby it is now fallen into Diſeſteem, tho' the antienteſt

Mineral Water in this County, and was of great repute and ſervice to the *Benedictine* Nuns and *St. Auguſtine* Friars, whoſe Vertue and Health were often owing to it. Four quarts of this Water exhaled, left thirty two Grains of ſediment, nine whereof was Salt, the reſt Earth, of a light brown Colour, which fermented violently with the acid Spirits. The Salt was Nitre; then the Sediment of this Water is to its Vehicle, as 1 to 1920.

123. *Walcote-Spaw* riſes out of the North-Eaſt Corner of a Cloſe on the Left hand from this to *Faulkingham*. It's a very clear, pleaſant Water; but has too ſmall a quantity of Salt to move the Belly much, tho' a very little laxative; but exceedingly light and diuretic. It has formerly been of very conſiderable Note; but what from the Nearneſs of *Aſwarby*, and the ill Temper of the preſent Poſſeſſor, who has cauſed it to be ſtopt up, and made up the Road to it, it's out of uſe. Five quarts of it exhaled, left a greyiſh white ſediment, mixt with ſmall white ſpecks like coarſe Flower, near eight Scruples, four Scruples and a half whereof was Salt, three Scruples and a half was Earth, of a dark whitiſh Colour, which fermented much with the acid Spirits. Then the Sediment is to the Water, as 1 to 380.

124. *Ansby-Spaw*, five quarts of it exhaled, left of greyiſh brown ſediment nine ſcruples and a half, five ſcruples whereof was Nitre, and four ſcruples and a half was Earth, which made a ſtrong Ebullition with the acid Spirits. All theſe Earths were a Mixture of Oker and Stone-powder; ſo the Sediment here is to the Water, as 1 to 202 $\frac{1}{9}$.

125. *Aſwarby*, *Ansby*, *Walcote* and *Semperingham*-Waters compared together *April* 28*th*, in a very dry ſeaſon, were as follows. The firſt with Solution of Silver, was firſt Pearl, then precipitated a large ſediment; the Liquor above was clear. The ſecond was of a pale White, then of a ſmall light Purple, had a Leaden coloured ſediment. The third was whitiſh, turned a little purpliſh, depoſited a pretty large ſediment, partly white, partly purpliſh. The laſt was a faint Pearl, a very ſmall white ſediment. With Tincture of Verdigreaſe, the firſt was of a Leaden Colour, then clear, with a large Orange-colour'd ſediment. The ſecond very little altered; the third and fourth yet leſs, with ſcarce any ſediment. With Tincture of Nephritic Wood, the firſt was firſt whitiſh, then green, with an Orange-colour'd ſediment, Laſtly, green throughout. The ſecond was firſt of a pale White, then green. The third and fourth were

greeniſh, had little Sediment : Had they ſtood ſome Hours longer, they had been wholly green. With Tincture of Rhubarb, *Aſwarby* was of a light Yellow, then of a dark yellowiſh Brown. The ſecond was a lighter Yellow, then a deep reddiſh Brown : The third of a deeper reddiſh Brown : The fourth yellow, then a dark Brown. With Solution of Sublimate, the firſt was yellowiſh, with little or no Sediment; the ſecond a pale Pearl; the third and fourth whitiſh Clear. With Solution of Sugar of Lead, the firſt was wholly of a dark White, and was the firſt that let fall a light brown Sediment; the ſecond, Pearl without Sediment; the third and fourth of a Leaden Colour. With Oil of Tartar the firſt was whitiſh, crudled, let fall much Sediment; the Liquor above was perfectly clear : The ſecond was full of Clouds, but let fall no Sediment, after it had ſtood four Hours : The third and fourth were near the ſame with the ſecond. With Spirit of Hartſhorn, the firſt was white, crudled, and let fall a Sediment one third the Contents of the Glaſs; the ſecond was white and cloudy; the third and fourth were only whitiſh, and had ſcarce any ſediment. The acid Spirits altered none of thoſe Waters. Syrup of Cloves alter'd the firſt to a blackiſh Blue : Syrup of Violets turned the firſt bluiſh, then of a Clay-colour, which in time would have been green; the ſecond was of a bluiſh Green, the third and fourth of a clear Green. Tincture of *Braſil* gave all four a faint reddiſh Caſt ; as Tincture of Fuſtic gave them a yellowiſh. With Tincture of Logwood, the firſt was of a Mazarine-Blue, crudled, let fall much deep blue ſediment Liquor above a Violet-Blue : The ſecond was a fainter Blue ; the third and fourth had neither ſo much ſediment, nor of ſo deep a Blue. With Tincture of Galls, the firſt was of a tranſparent Peas-bloom, then crudled, and let fall a large Sediment : The ſecond was much lighter ; the third very red, had little Precipitation, and that in ſmall Clouds, like Fibres of Blood ; the fourth was purple, crudled, and let fall a little ſediment.

126. Eight Miles from *Stamford*, four from *Bourne*, and two from *Stenfield*, is *Cawthorp*-Village ; in the middle of its Street riſes up into a large Baſon a Mineral Water, which foams much as it riſes up, and crudles Soap and Milk : It's conſiderably heavier than common Water. Tincture of Verdigreaſe turned it yellowiſh ; Solution of Silver, whitiſh ; Tincture of Rhubarb, firſt yellow, then a deep browniſh Yellow. Solution of Sublimate, of a Leaden Colour; Solution of Lead, white ; Oil of Tartar changed it very white, after which, a yellow Sediment, and a clear Liquor. It was clear with the

acid Spirits, only there was a viſible Ebullition on their Mixture. It was green with Spirit of Hartſhorn, bluiſh green with Syrup of Violets, yellow with Tincture of Fuſtic; with Tincture of *Braſil*-Wood, a Red, which preſently faded; a deep opaque Blue with Tincture of Logwood; an opaque Purple with Tinctures of Galls and Sumach. When a Gill of this Water had ſtood twelve Hours in a Pint-Mug, with Galls it ſtruck a very deep opaque Peas-bloom, became perfectly black, let fall much ſediment, and was perfectly clear next Morning. The Water above the Sediment, with the Tincture of Sumach, was a fine reddiſh Purple. That Water, with Tincture of Logwood had much deep blue Sediment, and a clear Liquor upon it. Theſe Glaſſes of it, with Tincture of Nephritic Wood, Oil of Tartar, and Spirit of Hartſhorn, had each of them much ſediment. Six Pints of this Water exhaled, left ſix Scruples of very white ſediment, fifty four Grains whereof was Salt, and ſixty ſix Grains Earth, which fermented, hiſſed, and ſmoak'd with Spirit of Vitriol, and yet the Loadſtone acted briskly on it after Calcination. The filtred Liquor boiled to a *Lixivium*, and ſet to cryſtalize, projected only Marine Salt, with ſome little Nitre. The Sediment of this *Spaw* is to the Water, as 1 to 334.

127. *Thurſk-Spaw* in the North Riding of *Yorkſhire* lies about a quarter of a Mile from the Town, on the ſide of the Road to *Northallerton*, in the Ground of one Mr. *Bell* of *Sowerby*, but anciently the Lordſhip of the Family of the *Laſcells*. It riſes up at the bottom of a Hill full Eaſt, boils up continually like a Pot, throws out above an hundred Gallons of Water in an Hour, colours its Baſon and Stream red, throws out Filaments or Films like Pieces of Gold-beaters Bladder. It is uncertain how long it has been known: The Report is, that it was accidentally diſcovered by ſome thirſty Travellers drinking of it, whom it purged. It throws out the ſame quantity of Water at all times: It is of a cryſtaline Colour, Inky ſmell and taſte, ſparkles like *Champaigne*, when poured freſh into a Glaſs. It will keep ſome Months without turning fetid. The Soil out of which it ſprings, conſiſts of firſt Gravel three or four Yards deep, then a red Clay four Yards deep, then Shale mixed with Iron ſtone and Marcaſites of Iron, under which very likely Coal. If drunk, from three Pints to ſix, it purges both by Urine and Stool. It's uſed both for Drinking and Bathing; and there are abundance of Inſtances, wherein it has cured Lameneſs, fix'd and wandring Pains, Eruptions on the Skin, Leproſie, *&c.* Tincture of Nephritic Wood

turned this Water, firſt of a Cream-colour, then green. Solution of Sublimate alter'd it not. Solution of Sugar of Lead made it of a thick muddy White, with much ſediment: Oil of Tartar, of a light Pearl-colour, and afterwards let fall a ſediment. The ſame it did with Spirits of Hartſhorn. Spirits of Vitriol and Salt turned it of a blackiſh Clear, full of Bubbles. Syrup of Violets, of a Graſs-green. With Tincture of red Saunders, a light Green; with Tincture of Fuſtic, a pale Yellow; with Tincture of *Braſil*, a very light Red; with Tincture of Logwood, a deep Blue, and let fall a large ſediment; with Tincture of Galls, a Purple, and let fall much ſediment; with green Tea, a blackiſh Purple; with red Roſes, a pale Purple; with Tincture of Sumach, a pale red Purple; with Brandy, blackiſh. Two Gallons of this Water exhaled, left nine Scruples of ſediment, four and a half whereof was Salt, the reſt Earth, of a whitiſh brown Colour, and fermented ſtrongly with Spirits of Vitriol and Salt. This Salt diſſolved, and ſet by to cryſtalize, afforded the beautifulleſt ſmall Cryſtals of Nitre of any of them, about Four Parts, and a Fifth Part Marine Salt. Then the Sediment of this *Spaw* is to its Water, as One to 682 $\frac{6}{9}$. The Salt and Earth are near equal.

128. At *Tibſhelf* in *Derbyſhire*, or *Tibſhall*, as it is commonly pronounc'd, is a reputed purgative Mineral Water: But how the Authors of the *Magna Britannia* have remov'd it to *Stanley*, is hard to tell: For I could only meet with a large Horſe-pond of common Water; nor did the Inhabitants ever hear of a *Spaw* there, before the kind Gentlemen made them a Preſent of an inviſible one, and that of no leſs note than that at *Quarndun*, and this as conſiderable as the *Yorkſhire Spaws*. But ſuch Blunders are unavoidable, when Men ſit at Eaſe in their warm Study, and take things upon truſt, and that very often from ſuch as are no Judges. But to our *Tibſhelf-Spaw*: It riſes up directly North, about the middle of a pretty long eaſy Deſcent, into a very good ſmall Stone-Receiver, under a Hedge cloſe by the Road-ſide, which goes to *Stenfield*. Half a Mile Eaſt of this is got very rich Iron-ſtone, and a quarter of a Mile South from it, is Plenty of good Coal. It leaves abundance of Oker, both in its Baſon and Stream. There are two things remarkable in this *Spaw*; firſt, tho' the Winter be never ſo Rainy, yet it is ſo dry till the Spring, that it can never fill its ſmall Baſon, far leſs run over. But during the Summer, let the Weather be never ſo droughty, it diſcharges it ſelf in a rapid ſtream of two Inches Diameter; and before Rain and high Winds it riſes impetuouſly in

Bubbles, turns whitiſh, white, or very white; which Bubbling or change of Colour is always in proportion to the quantity of Rain that's coming, or the height and ſtorminefs of the Wind that is to blow: After theſe are over, it returns to its natural Colour, which is very clear. Its ſmell is inky, and taſte ferruginous. With Solution of Silver this Water was white and thick; with Solution of Copper, a deep sky Blue; with Solution of Sugar of Lead a pale White, and thickiſh; with Oil of Tartar, white: The acid Spirits alter'd it not; with Syrup of Violets, a blackiſh Blue at firſt; with Tincture of *Braſil*-wood, a pale Red; with Tincture of Logwood, firſt reddiſh, then a deep Blue; with Tincture of Galls, firſt red, then purple, then Crimſon, without any Precipitation: But when a Precipitation was thrown in, there fell a ſediment half an Inch high, the Clear above being ſtill purple: with Tincture of *Sumach* it was a finer and ſtronger Purple than the laſt; with Brandy it was a blackiſh Purple. Theſe Experiments were made *October* 2, which was a very cold Day. A Pint of this Water taken up, kept ſeven Hours, and carried twenty Miles, had loſt its Tranſparency and fine ſparkling upon pouring out into a Glaſs, and was whitiſh. The preceding Mixtures repeated with it, and let ſtand thirteen Hours, were as follows: With Solution of Silver the Water was clear, a ſmall Precipitation at the bottom of the Glaſs, and an Incruſtation on the ſides; with Solution of Sublimate it had a bluiſh Pellicle on the ſurface, under that a clear Liquor below, which was a yellowiſh Precipitation; with Solution of Sugar of Lead, much white ſediment; with Oil of Tartar, many white Clouds, and a very ſmall woolly ſediment. Spirits of Vitriol and Salt made no Change; with Spirit of Hartſhorn, the Water was Cloudy, and let fall a ſmall yellow ſediment; with Syrup of Violets, a clear light Green; with Tincture of Fuſtic, a deep Yellow; with Tincture of *Braſil*, a deep opaque Red; with Tincture of Logwood, a deep opaque Blue; with Tincture of Galls, a fine Purple, without ſediment, but full of Clouds and Air-Bubbles; with Tincture of green Tea, a fainter Purple: with Tincture of *Sumach*, the darkeſt Purple of all, but afterwards turned of a thick dirty Purple. Four ſpoonfuls of this Water left in the bottom of an open Bottle fifteen Hours longer, ſtruck a briſk Purple with Galls; the ſame it did after ſix Hours more; but two remaining ſpoonfuls had wholly loſt this Property in thirty ſix Hours. When theſe Mixtures had ſtood thirty ſeven Hours longer, their further Alterations were, The Precipitation and Incruſtation with Solution of Silver were of a purple Colour, but the Water clear. That with Solution of Sublimate had a thick Pellicle and a large yellow ſediment. The Clouds in theſe, with Oil of Tartar and Spirit of Hartſhorn were fallen down, and the ſediments were larger. That with Syrup of Violets was clear, and perfectly green. Theſe with Tinctures of Logwood, Galls and green Tea, had retain'd their Colour, but no Precipitation. Theſe with Tinctures of *Sumach* and *French* Brandy had precipitated a deep blackiſh red ſediment, but in a very ſmall quantity. Three half Pints of this Water boiled away to One, then three half Pints more added to it, and made very hot, ſtruck a weak Purple with Galls. Theſe three Pints left a Scruple of ſediment, twelve Grains whereof was Salt; which ſet by to cryſtalize, three parts of it was Marine, and the fourth Nitre, exceeding white and fine: The Earth was a fine Orange-colour; it fermented ſtrongly, and turned a deep greeniſh Yellow with Spirit of Salt. Thus, the Sediment of this Water is to its Vehicle, as One to 1152.

129. To theſe, we ſhall add *Eaſt Retford Spaw* in *Nottinghamſhire*, tho' no ways entitled to this Claſs, but in Complement to common Fame, which will have it to be a purgative Water as well as vomiting. It was diſcovered about five Years ago, riſes up into a very neat new Stone-Baſon, covered with a pretty Pyramid of Free-ſtone. It ſprings up directly North, in the North-Eaſt Corner of the Town, common, out of a Soil between Clay and Sand. It's a ſlow Spring, its Water of a muddy whitiſh Colour, leaves Oker in its Baſon. It's cover'd with a whitiſh Scum. It's of a very Irony-taſte, and Inky ſmell: It makes a good Lather with Soap, and boils with Milk: It is not nauſeous do drink. The Water, with Solution of Silver is firſt whitiſh, then clear, and precipitated a ſmall cloudy white ſediment. With Tincture of Nephritic Wood, it was of a light Green; with Solution of Sublimate, it had a a ſmall tawny Orange-colour'd ſediment, whitiſh Liquor, and a thick Film upon it; with Oil of Tartar, firſt of a pale White, then clear, with a ſmall yellowiſh ſediment; with Syrup of Violets, green; with Tincture of Fuſtic, a deep browniſh Yellow; with Tincture of Logwood, blue at firſt, then a dark Black; but being diluted, it was blue again, and let fall ſome ſediment: With Tincture of Galls, a deep ſcarlet Red, which neither faded nor precipitated; with green Tea, a pale muddy Purple; with Tincture of *Sumach*, firſt a reddiſh Purple, then an opaque, dark reddiſh Brown; with Tincture of Rhubarb, it was a dark blackiſh Yellow; with Solution of Sugar of Lead, white, crudled,

led, and let fall a ſediment. The Water poured on Solution of Alum and Tincture of Galls mix'd, no Precipitation follow'd; but a Glaſs of Water poured on ten Drops of Tincture of Galls, and then Alum put in the Water, precipitated a ſmall fine purple ſediment. This Water ſtruck Purple with Galls in the ſecond, third and fourth Degrees of Heat, yea, gave a faint Tincture, after boiling a few Minutes. Five quarts of this Water exhaled, left eighteen Grains of a reddiſh brown ſediment, which afforded ten Grains of a light brown Salt, and eight Grains of Earth, which calcined, was much of it attracted by the Loadſtone. It fermented not with *Alcalies*, and very little with Spirits of Vitriol. Six Grains of the Salt diſſolved in three Ounces of Water, precipitated Solution of Silver, turned Syrup of Violets green, Tincture of Logwood a deep Blue, Tincture of Galls full of Clouds, and reddiſh The Sediment of this Water is to its Vehicle, as One to 4224.

130. We may join to theſe, *Buxton-Chalybeate*, not as it is a Purgative of it ſelf; but mixt with *St. Anne*'s Water, or *Bingham* Well, they prove a gentle Purgative, as I have experienced both in my ſelf, and obſerved in others. It riſes out of a Bank of Shale, on the North ſide of the Brook, oppoſite to the Hull. It is pretty clear as it riſes, but lets fall much Oker in its Baſon and Stream, weighs pretty near the ſame with common Water, lays the Spirits in the Thermometer one Eighth of an Inch lower than the River. It has a nauſeous, rough, and Irony taſte. Solution Gold alters it not; with Solution of Silver it's whitiſh, a clear Blue with Solution of Copper. It is white, both with Solution and Sugar of Lead, and lets fall a large white ſediment: With Solution of Mercury it is yellow, and has a large Cloud at bottom; with Solution of Sublimate it is firſt a Pearl-colour, then white: Oil of Tartar, and Spirit of Hartſhorn alter it little; Brandy turns it of a Leaden Colour; the acid Spirits make it a bluiſh Clear; Syrup of Cloves firſt makes it very red, then of a dark Blue; with Syrup of Violets it's a whitiſh Blue; with Tincture of Logwood it's blue; with Tinctures of Galls, green Tea, red Roſes and *Sumach*, it's a fine Purple; with Tincture of Rhubarb, greeniſh Yellow; with Tincture of *Braſil*-Wood, a light Purple. This Water put freſh into an empty Receiver, and the Air exhauſted, it quickly loſt much of its taſte, increaſed in Weight, and its Colour declined, and became muddy. Two Gallons and a half of this Water exhaled, left only two ſcruples and a half of ſediment very black, twenty eight Grains whereof was Earth,

which calcin'd, anſwer'd the Loadſtone ; twenty two Grains of Salt. The Sediment of this Water is to its Vehicle, as 1 to 3072. Six Grains of this Salt diſſolved in half a Pint of diſtilled Water warm'd, with Solution of Silver, it was firſt Pearl; then purpliſh, and let fall a ſmall ſediment ; with Solution of Sublimate, clear, and a ſediment like a little Wooll ; with Oil of Tartar, clear, and a little ſediment ; with Syrup of Cloves, of a dark muddy colour ; with Tincture of Logwood, a fine Blue ; with Tincture of Galls, muddy. The reſt of this Salt ſet to cryſtalize, it projected ſeveral Cryſtals of Marine Salt, mixt with a darkiſh Powder, which was Nitre ; ſo that this Spring contains volatile Vitriol, Sulphur, Oker, Marine Salt and Nitre : The firſt whereof is chiefly what is medicinal in this Water, and, as ſuch, has the Virtues of the *Simple Calybeates*.

131. Whilſt I was writing the above, the Country was alarm'd with the Diſcovery of an incomparable new *Spaw* at *Burlington* ; but it being Winter before the Report reach'd me, the Seaſon was elaps'd, and the Place at too great a diſtance to go to examine it. However, the following Hints may give ſome ſatiſfaction : The firſt is a Letter from Dr. —— of *Leeds*. “ *Sir*, having been in the Eaſt Riding of this County laſt Week, I met with a new Mineral Water ; ſo thought it not amiſs to acquaint you with it, as it ſeems to be of a different nature from any hitherto diſcover'd or commonly uſed (if the Account given me of it be juſt ; for I had neither time nor Conveniences to make any Tryals of it.) It's a ſmall Spring, riſing out of the Cliff or Bank of the Sea, near *Bridlington*-Key, about a Yard and half above the Sea-Sand, or High-Water, when the Tide is in, and might be made very convenient, ſhou'd it prove worth while. The Spring flows out of a thin Bed of Flint-Pebbles, which it tinges of a red Colour, as other Chalybeate Waters do. Mixt with Brandy (for I had nothing elſe at hand to try it with) it turns a dark blackiſh Colour. It taſtes almoſt like other Chalybeate Waters, but ſomething more harſh ; which, from the Effect a Perſon told me it had, I ſuſpect to be from Copper. He ſaid, ſeveral People had drunk of it this Summer ; and after drinking a Pint, or ſomewhat more, then walking, it affects the Head a little ; and upon drinking a Pint more, it vomits the Perſon ſeveral times, after which it purges briskly both by Stool and Urine. I a little ſuſpected the Veracity of my Informer ; becauſe he ſaid ſo very much in its Favour, and declaim'd in his way, againſt *Scarburgh*-Waters. Whereupon

“ I aſked another Man of that Place, there preſent, who gave me
“ much the ſame Account of it. The Water has no unplea-
“ ſant Taſte, and is very clear. The laſt Man told me, it turned a
“ little white, upon ſtanding ſome time, *&c.*”

As ſoon as I had received this Letter, I deſired a Gentleman of my Acquaintance to write to a Relation of his there, Mr. *William Carteel*, an eminent Apothecary, to exhale three Gallons of the Water to a Quart, and put it up in a Bottle, and ſend it me, together with two Quart-Bottles of it taken freſh up, cloſe cork'd and ſeal'd, which I received ſafe in a few Days. That Quart, which was the Remainder of the three Gallons, I boil'd away, and it left four ſcruples and fourteen Grains of a very white ſediment, ſweet like Loaf-Sugar. I took one Quart-Bottle of the Water for the following Mixtures. With Solutions of Siver, Sublimate, and Oil of Tartar it was very white ; with Spirit of Hartſhorn, a darkiſh White ; with Tincture of Rhubarb a light Yellow ; with Syrup of Cloves, blackiſh ; with Syrup of Violets, a light Green ; with Tincture of Logwood a beautiful deep Red ; with Tinctures of Galls and *Sumach*, very clear. But after it had ſtood ſix Days, that with Solution of Silver had a purple Incruſtation on the ſides, and a black ſediment at the bottom of the Glaſs ; that with Tincture of Nephritic Wood was a yellowiſh Green ; that with Tincture of Rhubarb, was a deep browniſh Yellow ; that with Solution of Sugar of Lead had a large white ſediment ; that with Oil of Tartar, a ſmall white ſediment ; that with Spirit of Salt was reddiſh ; that with Tincture of Logwood, was a reddiſh Brown ; that with Galls, a deep, thick, opaque Green. The other Quart of Water I exhaled, and had nine Grains of ſediment, whitiſh, and of a pungent ſaline Taſte. From this I extracted the Salt, and diſſolved it in diſtill'd Water half a Pint. This, with Solution of Silver, was firſt a Pearl-colour, then a fine light Purple ; with Solution of Sublimate, it was clear ; with Oil of Tartar, and Spirits of Hartſhorn, it was whitiſh, and precipitated a little ; with Syrup of Cloves, a blackiſh Blue ; with Syrup of Violets, very green ; with Tincture of Logwood, a clear dark Brown ; with Tincture of Galls, clear. The ſediment of the three Gallons being diſſolved in Water, and ſtirred, afforded ſixty Grains of white Calcarious Earth, which fermented with the acid Spirits, and thirty four Grains of Salt.

132. From which Experiments we ſee, that ſince it tinges its Baſon red, taſtes Chalybeate, and turns Brandy blackiſh, it contains Vitriol: But ſince it neither taſted Chalybeate at my Houſe, nor ſtruck Purple with Galls, &c. it's only a light volatile Vitriol, which is ſoon loſt. Since its Earth is perfectly white, and a ſtrong Alcaline, it's only Calcarious; ſince its Salt turns purple with Solution of Silver, is white, and precipitates with Oil of Tartar and Spirit of Hartſhorn, it's chiefly Nitrous. But ſince the Proportion of this Sediment is to the Vehicle, as 1 to 2048, then it's impoſſible this Water ſhould produce thoſe Effects from its ſediment, ſuppoſing it were all Salt. But a Quart of the Water (the ſuppoſed Doſe) affording only three Grains of Salt, allow this to be as ſtrong as Tartar Emetic a Grain and a half, and as much *Elaterium* mixt, it's too weak for ſuch a violent Operation. Therefore the Reporters being prejudic'd in favour of their Water, muſt have miſtaken the Doſe, or magnify'd its Effects.

133. Upon the whole, we may make the following brief Reflections: 1. Since two Quarts of *Scarburgh*-Water taken up in *November*, and exhaled only ſeven ſcruples and a half of ſediment; but two Quarts of it taken up, and exhaled, *July* 25, left eight ſcruples and thirteen grains of ſediment: And ſince a Gallon of *Stenfield-Spaw* taken up, and exhaled, *Apr.* 25, left fourteen ſcruples and eleven grains of ſediment; but a Gallon of the ſame taken up, and exhaled *Sept.* 7, tho' in a very great Drought, left ſcarce eight ſcruples of ſediment. Again, ſince ſix Gallons of *Aſwarby-Spaw* taken up, and exhaled *Apr.* 28, left three Ounces of Sediment, wanting Forty ſix grains; but the ſame quantity of it taken up, and exhaled, *Sept.* 11, left three Ounces and thirty four grains, &c. then it's evident, that the ſame Mineral Waters contain not the ſame quantity of fixt Parts, or Contents at all times; but there is a great difference in their Proportions at different times. 2. It alſo appears plainly, that ſome Waters fall much ſhorter of the Proportion of their Contents, than others: For *Stenfield* is deficient near an half, *Scarburgh* ſcarce one ſeventh, *Aſwarby* one eighteenth. 3. We ſee their Increaſe and Decreaſe happen not to be at the ſame ſeaſon in all. Thus *Scarburgh* and *Aſwarby* Deficiencies ſeem to fall out in Winter, when they are leaſt wanted; *Stenfield*, in Summer, when there is moſt occaſion for it. 2. Since *Stenfield*, *Scarburgh*, *Aſwarby*, *Malton*, &c. ſtrike a deeper Purple by much, and bear either Carriage or keeping, better in Winter than Summer; it follows, 1. That they are more

ſtrongly and richly impregnated with their Vitriolic Principle in Winter than Summer. 2. That this Principle is more cloſely united to the Water then; but ſits looſer, and is more ſeparable, as well as leſs, in Summer. 3. That where the principal Deſign of thoſe Waters is as an Alterative, or to remove Obſtructions; then ſuch of them as will keep, and are to be drunk at a diſtance, the ſooner in the Spring-ſeaſon they are taken up, ſo much better. 4. This ſudden flying off of the Chalybeate Principle ſeems chiefly owing to the Warmth and Rarefaction of the Air; which gives us this Remark, that theſe Waters bottled up, and carried to diſtant Places, would retain more of their Efficacy, if taken up, and carried in the Night, and kept in a cold Place. 3. Since a Solution, or Infuſion of *Malton*-ſediment, Salt and Earth, all turned purple with Galls, in Winter, but not in Summer, we ſee, that this Water actually contains one Principle more in Winter than Summer, *viz.* fixt Vitriol; and therefore ſome Waters may contain a Principle, more or leſs, at one time than another. 4 We ſee in *Malton*, *Stenfield*, and *Orſton*, before it was altered, the great miſchief the Water ſuffers by too large Reſervoirs, in Summer eſpecially, when we find all Mineral Waters are weakeſt of their Chalybeate Principle, and the very Light and Heat help to diſſipate their volatile Parts preſently: Therefore ſuch as expect, and want the Benefit of thoſe Waters, are not to be trifled with, and ſatisfied, before Levels are made, the old Wells taken down, and new ſmall Baſons laid in their bottom, ſo as they may have the Advantage of thoſe volatile Parts, which are by far the moſt penetrating, inciding, attenuating, and efficacious Alterative in thoſe and all other Waters. 5. From the Oker left in both Baſon and Stream of thoſe Waters, and the volatile Vitriol wherewith they are impregnated, we may juſtly conclude, there is a Solution of Iron-ſtone; but both Iron and Iron-ſtone containing much Sulphur, this alſo is diſſolved in the Abraſion and Waſte of the ſolid Stone: Therefore we muſt undeniably allow Sulphur in all thoſe Waters; which is further evident from their Scum, the Oily Colour of the Oker on the ſides of their Current, the blackneſs and ſolidneſs of their Mud, its Inflammability when dried, their liableneſs to Putrefaction on long keeping, the ſoftening, cleanſing, ſweetening, drying and healing nature of this Mud or Clay, when applied Plaiſter-ways to any Ulcer, Sore, Eruption, &c. on the ſurface of the Body. But of all the Chalybeate Waters I have examined, *Scarburgh* and *Aſwarby* contain moſt Sulphur: For in them, when fetid, ſome part of it may be precipitated and fixt. But as this is one of the Volatile Principles, ſo the Experiment will ſucceed better, if tried on Water taken up in cold Froſty Weather, or in Winter, than if taken up in Summer. 6. Such of thoſe Waters as contain moſtly, or only Nitrous Salt, are in many Caſes preferable to thoſe which contain only Marine Salt; the firſt cooling the Body, and changing into the nature of Animal Salts; the laſt heats it, and is unchangeable. Hence an Increaſe of Hectical or other ſlow Fevers, Thirſt, terrible Heat and Excoriation in the *Anus*, *&c.* upon their Uſe; unleſs the Deſign be to heat, ſtimulate, and rouſe up the Body; and then Waters impregnated with Marine Salt come in play, and have the preference. 7. We find from Experience and Obſervation, that all thoſe Waters drank in the ſame quantity, purge in proportion to their Salts. Hence *Scarburgh*, *Malton*, *Stenfield* and *Aſwarby* are the only Waters we have in theſe Bounds, whoſe quantity of Salt entitle them to this Claſs. *Thirsk*, *Cawthorp*, *Ansby*, *Orſton* and *Walcote*, which are only gentle Laxatives, but ſtrong Chalybeate Diuretics, are properly placed between the Purging and Diuretic Waters, and therefore allied to both. *Retford*, *Tibſhelf* and *Semperingham*, are no more than plain Chalybeat Diuretic Waters; and when they operate otherwiſe, it is from the mere Weight and Quantity of the Water drank, and the Laxneſs and Slipperineſs of the Bowels of the Drinker; and the like quantity of common Water will go near to do the like. Therefore they have no farther pretenſion to this Claſs, than what common Fame gives them. 8. We find from Experience, that the ſimple laxative, but ſtrong Chalybeate Waters, containing a brisk Mineral Spirit, and volatile Vitriol, are more diuretic, deobſtruent, ſtrengthening and invigorating, than ſimple ſtrong purgative Waters. 9. We alſo obſerve, that ſuch Waters, as either boil up impetuouſly, like a boiling Pot, or perpetually throw up Strings of Bubbles, are, of all others, moſt ſpirituous, and therefore the lighteſt upon the Stomach; powerfulleſt Diuretics, and go ſooneſt and eaſieſt off the Body. 10. From the Change of Colour in thoſe Waters upon ſtagnation, long keeping, or the like, we ſee are thus impoveriſhed by the loſs of their Mineral Spirit, and their tendency to Precipitation, when this is gone, and that their Earth exiſts in much larger Particles than their Salt; therefore more liable to Gravitation, and the more ſo, as it contains a Metalic Body, *viz.* Iron. 11. Since thoſe Waters are moſtly impoveriſhed, and made ſo much worſe by ſtanding, carrying or keeping, then ſuch as would have benefit by them, are to repair to the Fountain-head, where they may have them to all advantage.

From theſe few Inferences, a great many *Scholiums* may be drawn, everſive of many Errors, both in Theory and Practice, beſides what I have already ſaid, or will afterwards occur. But my Work yet remaining, will not ſuffer to expatiate. Therefore proceed we to the next Claſs, which ſhall be as an Appendix, *viz.*

PART III.

Of the Diuretic Chalybeate WATERS.

133. COME we now to another Claſs of the ſame ſort of Waters, but which operate after another manner, *viz.* by Urine; and whoſe whole Vertue depends upon their volatile Principles, without any regard to their minute, inconſiderable fixt Parts; which are ſo ſmall, that they deſerve very little notice, as they can anſwer but very inſignificant Ends. The moſt noted and ancient of thoſe, is the *Tuewhet-Spaw* at *Harrigate*, which was firſt diſcover'd by one Mr. *William Slingsby*, about the Year 1571, and was wrote upon by Dr. *Dean* of *York* in 1626 [a].

134. *Harri-*

[a] *Spandarine Anglica*, or the *Engliſh Spaw* Fountain; being a brief Treatiſe of the acid, tart Fountain in the Foreſt of *Knaresburgh* in the Weſt Riding of *Yorkſhire*: As alſo a Relation of other medicinal Waters in the ſaid Foreſt. By *Edm. Dean*, Doctor in Phyſick, *Oxon*, dwelling in *York*; in 4to. p. 32. *London*, printed by *John Griſmond*, 1626.

At *Knaresburgh* the Pole is elevated fifty four Degrees and twenty Minutes. The Town is fenced by the River *Nid* on the South and Weſt Parts, beautified with two Stone-Bridges and an ancient Caſtle, juſt by *Knaresburgh*-Foreſt, and the King's Park, *Bilton*-Park, well ſtor'd with Deer. The Town ſtands on a Hill, having a Deſcent on all ſides, ſituated among ſundry fruitful Vallies. The Water is good, the Air dry and clear. In ſhort, it's well provided with all Conveniencies of Life.

Ch. 2. No Place in this Nation can boaſt of ſuch Diverſity of Earths, Quarries of Stone, Minerals, and Mines of Metals, and all this at a very ſmall Diſtance: For here we have white and yellow Marle, Plaiſter, Oker, or Rubrie Free-ſtone, hard gritt Stone, a ſoft reddiſh Stone, Iron-ſtone, Brimſtone, Vitriol, Nitre, Allum, Lead, Copper, and many other Minerals might be found out by the Diligent and Ingenious. All which demonſtrate, that Nature has ſtored this little Territory with a greater Diverſity of hidden Benefits, than great and ſpacious Countries, otherwiſe abounding in outward native Commodities; and that the Fountains hereabouts muſt partake of their Nature and Properties.

Ch. 3. Of Springs, we have Plenty, and of ſuch Reputation, that two of them are Sainted, *viz.* St. *Mungo*'s and

134. *Harrigate* lies ſixteen Miles Weſt of *York*, ten Miles North of *Leeds*, ſeven Miles South of *Rippon*, two Miles Weſt of *Knaresburgh*, fourteen Miles North-Eaſt of *Bradforth*, fourteen Miles Eaſt of *Skipton*. It's ſituate on the North-Eaſt of *Knaresburgh*-Foreſt; a Place that may juſtly challenge *Britain*, and perhaps all *Europe*, for its great Number and Variety of Mineral Waters: But at preſent we ſhall only treat of its Chalybeates: The firſt whereof is the Allum-Well in the Bogg, which has a Stone-Baſon for its Receptacle; tho' at preſent there is no occaſion for it, this Spring having found ſome other Out-let; but might eaſily be reſtored to its former Channel. About this Alum-Well is firſt black Peat-Moſs, about half a Yard, or two Foot deep: Under this, mixt with it, are Heaps of Con-

and St. *Robert's* Well; to which have flocked for Bathing, innumerable Herds of People theſe laſt two Years, tho' they contain no Mineral, and are of no credit at preſent; for Superſtition and their Reputation live and die together; their great and famed Cures having been rather feigned and imaginary, than real.

Ch. 4, and 5. Beſides great plenty of Springs of common Water, we have here Five worthy the Phyſician's Obſervation; the firſt whereof, over-againſt the Caſtle, is called the *dropping Well*, becauſe it drops, diſtils and trickles down from the Rock above; the Water whereof is of a petrefying nature, turns every thing to a ſtony Subſtance in a ſhort time. At firſt it riſes up not far from the ſaid Rock, and running a little way in one intire Current, till it comes almoſt to the Brim of the Cragg; where being oppoſed by a Dam (as it were Artificial) of certain ſpongy Stones, it afterwards is divided into many ſmaller Branches, and falls from on high. It's ſaid to be very effectual in ſtaying any Flux of the Body. Three other Wells, being much of the ſame nature, are called by the Populace, *ſtinking Wells*: becauſe they have a fetid Smell, conſiſting moſt of *Sulphur vive*. One of them, that has the greateſt Stream of Water, is in *Bilton*-Park; the other two are in the Foreſt; one is near the Town, the third is two Miles beyond *Harrigate*-Head in a Bottom, on the Right-hand, and almoſt at the ſide of a little Brook. Theſe are ſulphureous Fountains, and caſt forth a ſtinking ſmell afar off, in the Winter-ſeaſon, and coldeſt Weather eſpecially. They are very cold, and have no manifeſt Heat, becauſe their Mines and Veins of Brimſtone are not kindled under the Earth, being hindred from the Mixture of Salt therewith. Such as drink the Water verily believe, there is Gunpowder in it, and they vomit it up again. They leave upon Graſs, Leaves, and Sticks in their Currents, a grey ſlimy Subſtance, which being ſet on fire, has ſmell of common Sulphur. They are much haunted with Pidgeons, from their contained Salt. White Metal dipt in them, preſently becomes like Copper. They have the ſame Properties with other cold, ſaline, ſulphureous Baths. The common People drink them, and they expel Reef and Fellon. They ſoon help and cure by Waſhing and Bathing, Itch, Scab, Morphew, Tettars, Ringworm, and the like. But this would be ſooner and more conveniently done at that in *Bilton*-Park, were it divided into two capacious Baths, the one naturally cold, and the other artificially kept warm ſome Hours in a Day. The fifth is that on which I principally write: It's an a-

Concretions of green Vitriol both mature and immature, prodigious quantities of Sulphur, and much Earth, which calcin'd anſwers the Loadſtone. Under theſe, is a Bed of Clay two Foot and a half deep, without any ſenſible Marly of Sulphur, except where the Sulphur Waters riſe. There is a good Deſcent from this Bog, to carry off the Water from it into the Brook. About half a Mile from this, they have ſeveral times, and in ſundry Places, boared for Coal, and found the following *Strata* of Earths; firſt, Moſs, then whitiſh blue Clay four Yards thick, then Gravel two Yards thick; laſtly, Shale twenty Yards thick. Here they could go no lower, finding the Water come in with the impetuous force of a ſubterranean Current; but never got through
this

cid or tart Fountain in the ſaid Foreſt, commonly called the *Turwhet-Well*, or *Engliſh Spaw*; the laſt, in imitation of the famous *German* Chalybeate, *viz.* the *Sauvenir* and *Pouhon*.

Ch. 6. This fifth Spaw is a Mile and half from *Knaresburgh*, up a very gentle Aſcent, near *Harrigate*, has much the ſame Situation with the foreſaid Spaws in *Germany*. It was diſcovered firſt about fifty Years ago, by one Mr. *William Slingsby*, who had travelled in *Germany* in his younger Years, ſeen, and been acquainted with theirs; and as he was of an ancient Family near the Place, ſo he had fine Parts, and was a capable Judge. He lived ſome time at a Grange-Houſe near it; then removed to *Bilton*-Park, where he ſpent the reſt of his Days: He uſing this Water yearly, found it exactly like the *German Spaw*. He made ſeveral Tryals of it, then walled it about, and paved it in the bottom with two large Stone-Flags, with a Hole in their ſides for the free Acceſs of the Water, which ſprings up only at the bottom, through a Chink or Cranny left on purpoſe. Its Current is always near the ſame, and is about the quantity of the *Sauvenir*, to which Mr. *Slingsby* thought it preferable, being more brisk and lively, fuller of Mineral Spirits, of ſpeedier Operation; he found much benefit by it. Dr. *Tim. Bright*, about thirty Years ago, firſt gave it the Name of the *Engliſh Spaw*: Having ſpent ſome time at thoſe in *Germany*, he was Judge of both; and had ſo good an Opinion of ours, that he ſent many Patients hither yearly, and every Summer drank the Waters upon the Place himſelf. And Dr. *Anthony Hunter*, late Phyſician at *Newark* upon *Trent*, often chided us Phyſicians in *York* for not writing upon it, and deſervedly ſetting it upon the Wings of Fame.

Ch. 7, 8, 9. Experience and Tryals do ſufficiently ſatisfy us, what Minerals this Water paſſes through, and imbibes; but their Quantity we know not, nor in what Proportions they are mix'd. That Vitriol is moſt predominant, is evident from its Tartar and Inky Taſte and Smell, like the ancient Spaws. And as much powder'd Gall as will lie on a Silver Twopence, turns a Glaſs-full of this Water of an exact Claret-colour, at the Spring-head; but not when it's carried; for it ſtrikes a faint Purple at *York*; and carried yet twenty or thirty Miles further, it differs not from common Water: For having more of the Spirit, and leſs of the Minerals of the *Sauvenir-Spaw*, it keeps ſhorter time, is not to be tranſported far off; but having a thinner, and more ſpirituous Body, more airy, ſubtil, and piercing Exhalations, it's of a quicker and brisker Operation, tho' it vaniſh and fly off, which is a moſt ineſtimable Property this Shale. Twenty two Yards South-Weſt of the Allum-Well, is a Chalybeate Spring; and in a plow'd Field or Intack, call'd the *Parſon's Intack*, about two hundred Yards South-Eaſt of the Bogg; when the Ground is new-plow'd, or harrow'd, and has had a Shower of Rain, follow'd with a bright Sun beam, there are found beautiful, ſmall, hard, tranſparent Stones, call'd Diamonds, from their

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perty of this rare Fountain, tho' as ſuch, only valuable at the Spring-Head. The Qualities of Vitriol are by ancient Phyſicians found to be healing, drying, binding, reſiſting Putrefaction, and a Strengthener of the inward Parts: It kills flat Worms in the Belly, cures the Venom of Muſhromes, preſerves ſpongy Fleſh from Corruption, dries, heals and diſſipates it, expreſſing the ſuperfluous Moiſture, is profitable againſt Plague and Peſtilence; its Oil and Vitriol are diuretic, excellent in the Stone, Stoppage of Urine, *&c.* And the Chymiſts think, that out of Vitriol might be made all kind of Medicines neceſſary for the Apothecaries Shop. And though Vitriol, which is hot and dry, be the predominant Principle here, yet the Water has not that Heat and Acrimony, ſo as to be either unprofitable or hurtful: For this, and other like Springs have their Vitriol but weakly, and that with a Mixture of divers other Minerals of oppoſite nature; and alſo this Mineral is in ſo ſmall a Proportion to the Water, that it's ſcarcely perceived.

Ch. 10. Tho' this Water cool at firſt, yet after ſome Days drinking, it heats and dries: But it affects ſundry ways, cooling ſome, healing, moiſtening and drying others. But Waters impregnated with this Vitrioline Principle, preſently heal, and as it were, miraculouſly cure Diſeaſes, which were beyond all hopes of Recovery. They paſs the Meanders and Turnings and Windings of the whole Body, ſweeping away whatſoever hurts or endamages it, not touching what is uſeful, contracting and ſtrengthening what is flaccid and looſe, relaxing what's contracted, inciding, attenuating, diſſolving and expelling what is groſs and thick. This Fountain eſpecially, has an inciſive and abſterſive Faculty, to cut and looſen viſcous and clammy Humours of the Body, and to make the groſs movable; as alſo by its piercing and penetrating Power, ſubtility of Parts, and by its deterging and deſiccative Qualities to open all Obſtructions and Oppilations of the Myſentery (from whence ſpring the Seeds of moſt Diſeaſes), Liver, Spleen, Kidnies, and other inward Parts; and to cool and to temperate their natural Heat, helping and removing alſo all the Griefs and Infirmities depending thereupon. From the Aſtriction of its Mineral it comforts the Stomach; ſo that, of a thouſand, who ſhall drink it directly, and with good Advice, (after due Preparation, as the Caſe requires) ſcarce one but who ſhall receive much Benefit by it. It cleanſes and purifies the whole Maſs of Blood, by purging it from the peccant Seroſities, Choler, Flegm and Melancholy, and that chiefly by Urine. The Drinkers Stools are commonly black, or of a dark Green, from the Mixture of the Minerals with the Aloine Feces. Hence its ſeveral and different viſible Effects and Property in evacuating the noxious Humours of the Body, moſtly by Urine, when there are any Obſtructions about the Kidnies, Ureters and Bladder; or by Urine and Stool both, when the Myſentery, Liver and Spleen are obſtructed. But if the Grief be Uterine, it relieves it according to the uſual manner. It purges Melancholics by Hæmorrhoids, and Cholerics by Siege; rarely vomits or ſweats. As it promotes diminiſhed, or reſtores their Weight, Tranſparency, Hexagon, Figure, and cutting of Glaſs, in bigneſs, from a Pin's Head, to a Bean; but it's very rare to find one of the laſt Magnitude perfect. The North-Eaſt End of the Moraſs

reſtores obſtructed Evacuations; ſo it ſtays the ſuperfluous.

From theſe many and ſeveral Operations and Effects (from Minerals of a different nature mixt) it performs Cures, which few or no Medicines artfully compos'd can do. Wherefore when 'tis drunk, with due Caution and Advice, it's beneficial in the following Maladies: It dries the too moiſt Brain, and helps Rheums, Catarrhs, Palſies, Cramps, &c. It's good againſt inveterate Head-achs, Megrims, Vertigo, Epilepſy, Convulſions, and the like cold and moiſt Diſeaſes of the Head. It chears the Spirits, ſtrengthens the Stomach, cauſes a good and quick Appetite, and promotes Digeſtion. It's good in the Black and Yellow Jaundice and Hippo, as alſo in a Cachexy, and beginning Dropſy, ſeeing it opens Obſtructions and expels redundant Seroſities. It cools the Reins, Ureters and Bladder, with its Neck and Sphincter; expels Sand, Gravel, and Mucus, and prevents their Generation afreſh. It cures Ulcers, Fiſtula's, or other Sores of thoſe Places, or in the *Perinæum*, by its cleanſing, ſarcolic, cicatrizing, and corroborating Quality. It's no leſs profitable in the ſharpneſs, difficulty, or ſtoppage of Urine: But if the Stone is too large, we are not to expect Relief: Or where the Wound after Lithotomy is *ſlow* in Cure, it certainly facilitates, haſtens and perfects it. It's of remarkable ſervice in old Gleets. There are few Diſeaſes peculiar to Women, which it will not cure, with good Advice and proper Management; as, the Green-ſickneſs, too plentiful, frequent, deficient, or irregular Menſes, *Fluor albus*, too great Humidity and Slipperineſs of the *Uterus*, which this Water dries, ſtrengthens, and reſtores its Retention and Fecundity. Many are the Inſtances we have ſeen of thoſe. It's no leſs ſerviceable in ſchirrhous and cancerous Tumours, Ulcers or Sores of the *Uterus*; but then the Water muſt be both drank and injected: But ſuch as are with Child, muſt refrain both. It kills and expels all ſorts of Worms in the Body, and prevents their Generation anew. But the Excellency of the Sulphur-Waters appears chiefly in Cutaneous Caſes.

Ch. 12. But after all, it's not the Knowledge, but the right and ſeaſonable uſe of It, that makes it beneficial; and herein it ſhares the common Fate with Food and Phyſick, the Abuſe or unſeaſonable uſe whereof often do much miſchief. Let the Patient then conſult a Phyſician, who underſtands the nature of the Water, whether it's proper in the Caſe offered, or not. If the firſt, let the Patient repair thither at a fit ſeaſon, without long and tedious Journies to fatigue himſelf. When come, let him reſt a Day or two, and in the Interim prepare his Body with ſome gentle Lenitive, ſuited to his Diſtemper and Conſtitution. Firſt of all, give an emollient Glyſter; for theſe carry off the Excrements, clear the Inteſtines, and make an open Paſſage for the Water, without its carrying thoſe Impurities into the Blood. And even in the hotteſt Seaſon and Dog-Days, theſe Lenitives, being mild, weak and ſafe, can do no miſchief, eſpecially in thoſe Northerly cold Climates. Bleeding alſo in plethoric Habits will be of ſervice, however an old, riveted and often fatal Error hath prevailed to the contrary. But it is now full time it ſhould be kick'd out of doors: For tho' purging Medicines may, and do increaſe the Blood's Motion and Rarefaction, in very hot Weather eſpecially, and may thereupon be inconvenient or dangerous; yet in our cold Country there is no fear of this from ſuch Lenitives, Moraſs or Bogg, lying naked from all Graſs, is candied over in the Summer-time with Salt, a part whereof is daily pick'd up by great Flocks of Pidgeons, which reſort thither from all Parts. About an hundred Yards South-Eaſt of the Three Sulphur Wells, is a ſmall ouzing Chalybeate, riſing out of a ſmall ſhaly Ground. Half a Mile

tives, or other neceſſary gentle Evacuations. All the ancient Purgatives were ſo ſtrong, that they are now quite laid aſide, and very rarely, if ever, uſed. Therefore *Hippocrates* had good reaſon to forbid them in the Dog-Days, and we more particularly, are not to uſe ſuch with our Mineral Waters.

Ch. 1, 13, 14, 15. As to the propereſt Seaſon for the uſe of thoſe Waters in the general, they may be drunk whenever the Air is pure, clear, hot and dry; but refrain drinking, when the Air is cold, moiſt, dull, and miſty: But the fitteſt time ſeems to be from the middle of *June*, to the Middle of *September*; for then the Air is generally in the firſt ſtate: And if there has been much Rain fallen, let the Well be laded dry, before ye begin to drink; the beſt time for which, and Exerciſe, ſeems to be from Seven to Ten a clock in the Morning. Exerciſe promotes the Diſtribution of the Water, and their Effects and Evacuation: The Strong may walk to it, the Weak ride, and the Sick drink it in their Chambers, having it brought to them directly, in Bottles cloſe corked, and kept in a cool Place. The Quantity to be drunk, belongs to the Phyſician attending, to be determin'd. But, in the general, begin with a moderate Doſe, and by degrees increaſe daily to three, four or five Pints; and towards the End make the like proportionable Abatement daily. It is not ſafe to drink too much, leſt they load and overcharge Nature; a leſſer Quantity, and drunk for a longer time, will anſwer much better and ſafer. But the due Quantity muſt ever be judged, from its due and ready Digeſtion and Evacuation. The Morning drinking is ſufficient; and faſt three or four Hours after it: But if Neceſſity, together with the Phyſician's Advice, call you to drink it twice a day, dine ſparingly, and drink none for four hours after; but exceed not the half Quantity you drank in the Morning. Let the drinkers uſe a moderate quantity of Meat and Drink, of light and eaſy digeſtion, good and wholſome, affording laudable Juice; but ſuch as breed crude and bad Humours muſt be refrained, and alſo Variety of Diſhes eaten at the ſame Meal; and all Pickles, Spices, Sauces, Fat, *&c.* in dreſſing. They muſt alſo avoid all ſalt Meats, Beef, Bacon, Pork, Lard, and larded Meats, Hare, Veniſon, Tripes, and all other Entrails of Beaſts, Blood-Pudding, Geeſe, Pigs, Swans, Teale, Mallard, and all other Water Fowl, being of hard Digeſtion and ill Nouriſhment. And among Fiſh, Salmon, Eels, Lamprey, Herring, and ſalt Ling, all ſalt Fiſh, Sturgeon, Oyſters, Anchovies, Cockles, Muſcles, and Shell-fiſh. I likewiſe diſallow of the white Meats, Milk-Curds, Cream, old Cheeſe, Cuſtards, white-Pots, Pudding-Pies. Of Fruits, Apples, Pears, Plums, Codlings, Gooſberries, and and all ſuch Summer Fruits, either raw, or in Tarts and Pyes; and all Peas and Beans, cold Sallads, raw Herbs, Onions, Leeks, Chives, Cabbage, Coleworts, Pompions, Cucumbers and the like: Nor ſhould they uſe much Exerciſe after Dinner; nor ſit heavy, ſullen, dull, muſing or ſlumbering; but a little gentle walking, or chearful Converſation. Let therefore their Diet be Hens, Capons, Pullets, Chickens, Partridges, Pheaſants, Turkies, and generally all Wood and Mountain-Fowls; Veal, Mutton, Kid, Lamb, Rabbits, young Hare, Leverets, *&c.* and theſe rather roſted than boiled, except Uſe or Conſtitution require the laſt. Of Fiſh, Trouts, Mile South of this, in a Bottom, within a Span of a ſmall Rivulet-ſide, between two very eaſy Deſcents, riſes *Tuewhet-Spaw*, out of a Moſs above, blue Clay below, and Shale under that. This, for Antiquity, challenges the Precedency of all the Mineral Waters in *Yorkſhire*, being the only Chalybeate in the County, either known or uſed. Then, and long after, Dr. *Bright* and Dr. *Hunter* were its firſt Promoters; then came our Author: So that we ſee, the Authors of the *Magna Britannia* are out in their gueſs, near fifty Years, by their jumbling *Scarburgh* and this together. Dr. *Michael Stanhope* [b] of

York

Trouts, Pearches, Loches, and all ſcaly Brook and River Fiſh; Smelts, Soales, Dabbs, Whitings, Turbut, Gurnet, and all ſuch other that are not heavy and unwholſome. Theſe may be altered with Mint, Hyſop, Aniſe, *&c.* Alſo Cray-fiſh, Crab-fiſh, Lobſters, and the like; Raiſins with Almonds, Bisket-Bread, Marſhpan ſtuff, Suckets, *&c.* well kneaded and leaven'd white Bread, old well-brew'd Beer, but not ſtale, tart, ſharp or ſoure; nor by any means let it be mix'd with *Spaw*-Water. Inſtead of Cheeſe at Meals, eat candy'd Lemon or Citron-Peel, or Comfits of Aniſe, Fennel, Carvy or Coriander, to warm and ſtrengthen the Stomach, and expel Wind; ſweet Butter, new Cream Cheeſe.

Ch. 16. Tho' Accidents ſeldom intervene to the Strong, on the uſe of thoſe Waters, yet ſometimes Inconveniencies may accrue to the Weak; as, their Retention in the Body, Inflation of the Belly, Coſtiveneſs, and the like. Wherefore, to cauſe a ſpeedy Paſſage of it by Urine, let the Patient go into his naked Bed an Hour or two; it warms, relaxes the Paſſage, and the force and weight of the Waters make way. Let warm Cloaths at the ſame time be apply'd to the Stomach, but not to provoke Sweat: Or if the Perſon can bear it, pretty brisk Exerciſe: But both theſe failing, throw up a ſtimulating Glyſter. For a Fulneſs or Inflation of the Belly, walk about, eat Carminatives, and inject a Glyſter of the ſame ſort. For Coſtiveneſs, eat moiſt mollifying Foods and Herbs, as Raiſins, Prunes, Tamarinds, Butter, Yolks of Eggs, *&c.* in Broth. If theſe fail, give ſome Lenitive Medicine, and forbear the Water a Day or two, till the Paſſages are opened.

[b] Cures without Care; or, a Summons to all ſuch as find little or no help by the Uſe of Phyſick, to repair to the Northern *Spaw*; wherein by many Precedents of a few late Years, it's proved to the World, that Infirmities, of their own nature deſperate, and of long continuance, have receiv'd perfect Cure by Virtue of Mineral Waters near *Knareſburgh*, in the Weſt Riding of *Yorkſhire*, &c. by *Michael Stanhope. London*, Printed by *Will. Jones*, 1632, in 4*to*. P. 32. Dedicated to the Right Honourable the Lord *Wentworth* of *Wentworth*-Houſe, Baron *Newnham* and *Overſty*, Viſcount *Wentworth*, &c. &c.

Preface. That our Water we are about to deſcribe, partakes of Vitriol, is evident from its rough harſh Taſte, like that of Vitriol. 2. Its Inky and Vitriolic Smell. 3. Galls or Oak-Leaves turning it Purple. 4. An Oak-ſtick bruiſed at the End, and the Water ſtirred about with it, turns of a Saphire-Blue. 5. Its leaving ſo much Oker in its Channel. 6. The whole Soil where the Water riſes, is full of Iron-ſtone; and the former Iron-Works here have occaſioned the total Conſumption of the Wood on the Foreſt. Within half a Mile of the *Spaw* are ſtill to be ſeen the Ruins of a great

Iron-

York, was the next Writer on this *Spaw*, in 1631; who gives us a Catalogue of Cures performed by this Water; ſome whereof are perhaps the greateſt and moſt remarkable, filed up in the Authentic Records of Phyſic, down from *Hippocrates* to this Day. But he alſo

Iron-Work; and by digging a little, you may ſtill find Plenty of Iron-ſtone in moſt Places, even expoſed to the Day in broken Banks on the Earth's ſurface. 7. The Drinkers Stools are blackiſh, or deep Green. 8. The Efficacy of the Water in all ſorts of Obſtructions, proves it to be Martial. If any is incredulous to the Virtue and Efficacy of thoſe Waters, let him pauſe a little, and reflect on the Properties of its impregnating Ingredients, and they will be better ſatisfied: As firſt, Sulphur, which attracts, reſolves, mollifies, diſcuſſes, cools and dries. 2. Salt is aſtringent, deterging, purging, diſperſing, attenuating, and preſerves from Putrefaction. Iron is both of a deobſtruent and aſtringent nature. 4. Vitriol heats and binds, is of very ſubtil Parts, and of a penetrating nature. Hence theſe Waters looſen and ſcatter viſcous and clammy Humours, attenuate the Groſs, and open the Paſſages of the Liver, Spleen, Myſentery, Kidnies, *&c.* by their penetrating Power.

A true Relation of certain Cures done by the Mineral Waters near Knaresburgh.

Dr. *Dean* of *York* having wrote upon, and recommended the *Tuewhet-Spaw*, about ſix Years ago, in ſeveral Diſtempers, we are now to give an Account of ſeveral ſurpriſing Cures done by it. But give me leave to advertize you, that laſt Year, 1631, I diſcover'd a new Spring a quarter of a Mile nearer, which exceeds the former on this Account: 1. It's ſituate on the Deſcent of a great Hill, has firm Ground and dry Walks round about it: The other lies in a Flat, the Ground about it is Boggy, other Waters ſink in, and there is little room for Exerciſe. 2. This changes ſooner and deeper with Galls than the other. 3. It's lighter, leſs nauſeous, and goes ſooner off than the other. 4. It will carry further, and keep better and longer, being put in clean, new cloſe Bottles. 5. Beſides the Iron and Vitriol, this has alſo a little Sulphur, which makes it more Balſamic and healing. Near this, are thoſe Sulphur-Waters of different degrees of Strength, ſo loaded with Salt, that two Quarts of the ſtrongeſt exhaled, leaves half an Ounce; another as ſulphureous, but not ſenſibly ſalt; the third, a Mean betwixt both. The firſt only is uſed, and has ſufficiently play'd its part, to the great Gain of the Drinkers; tho' the other two, if well examined and tried, might be more ſerviceable to ſome Bodies. Tho' theſe *Spaws* ordinarily challenge a Peculiarity in Curing (if curable) the Stone and Gravel, in opening Obſtructions of the Spleen, and allaying all melancholy Effects and Paſſions; yet it will appear, that ſuch Waters have other rare and ſecret Operations and Influences, to the great Surprize of the Beholder.

But, to the Cures: In 1626, Mrs. *Rolf* of *Hadley* in *Suffolk*, fell into the Gravel, got the beſt Advice ſhe could; but found no Relief, till ſhe was brought to the *Tuewhet*-Well; in a Fortnight's time ſhe voided an hundred Stones of ſeveral ſizes; her Pain went off, ſhe recover'd, and continued well. *Henry Curra* of *Whardah* in the Weſt of *Yorkſhire*, aged about fifty Years, Servant to Sir *Peter Middleton*, was a great Sufferer many Years, could neither ride, walk nor move: He came here, and in a Months time, by the Uſe of the ſame Spaw, he voided many Stones, ſeveral of them as big as Peas: He alſo recover'd a firm ſtate of Health. *Henry Rowley* of *Linton* near *Weatherby*, aged ſixty Years, was long tormented with a ſtoppage alſo diſcovers, adds and prefers another Chalybeate Water to this, call'd the *Sweet Spaw*, in oppoſition to the Sulphur-Wells. It's a pity this ſmall Tract is ſo ſcarce: But this large Epitome, I hope, will in a good meaſure compenſate that. But it's a greater pity, that

ſtoppage of Water; till this Spaw opened the Flood-gate, and let off great quantities of Mucus and Gravel, whereby he was reſtor'd to Health. But moſt remarkable, and next to a Miracle, was the Recovery of Mrs. *Barker* of *Dore* in *Derbyſhire*, aged thirty four Years: She had long a dangerous Ulcer in her Kidnies, a very obſtructed, weak, emaciated Body, could not walk over the Houſe, without one or two to ſupport her, had neither Appetite nor Digeſtion, no, for the ſmalleſt Broths; ſhe was returned to her firſt Food, Womans Milk, maugre the Art of Phyſick and moſt Learned Profeſſors. In this weak, low, hopeleſs State ſhe was brought hither; ſhe, to her poor, ſmall Ability, drunk the Water; in a few days after, ſhe diſcharged an incredible Quantity of purulent Matter, whereby ſhe was ſo relieved, that ſhe got ſtrength, recover'd Appetite, and her Obſtructions open'd, and in five Weeks was reſtored to a healthy ſtrong Habit of Body, and next Year returned to the *Spaw* perfectly well. The like Cure of an ulcerated Kidney did Mrs. *Ellis*, Spouſe to Mr. *Ellis*, Miniſter of *Beverly*, receive here. Mrs. *May* of *York*, of a very great Age, long confined to her Bed, and tortur'd with Fits of the Stone, yet was ſet intirely at rights here. In Melancholy, and ſplenatic Ilneſſes, few, if any at all have miſſed of perfect Cure; inſtance, Mr. *Sacheverell* near *Hopton* in *Derbyſhire*, who had long led a moſt miſerable, languiſhing, deſpairing Life; yet being ſent hither by Dr. *Dean*'s Advice, met with a moſt welcome deſired Cure. Mr. *Ayre* of *Ramton* in *Nottinghamſhire*, in the like moſt wretched Condition. Mr. *Wallis*, aged fifty Years, was cured of an Aſthma by this Water. Mr. *Thompſon*, Poſt-maſter of *Weatherby*, who had been ill twenty eight Weeks of a Hectic; and in ſpite of the beſt and moſt ſuitable Advice, was given up for Death; yet applying himſelf to this Water, in the middle of Winter, was intirely cured in a Fortnight. *Will. Shan* of *Medley* in *Yorkſhire*, long troubled with a Stoppage of Water, with moſt intolerable Pain, in one of his Agonies run an Iron Inſtrument up his Yard; and pulling it violently back, open'd the Paſſage for a great quantity of Water and Blood: The Wound prov'd Ulcerous, and could not be healed till he came to this *Spaw*; where in a few days he was cured both of his Diſeaſe and Ulcer. The Counteſs of *Buckingham* (all other means failling) repair'd hither for the Cure of a ſevere Aſthma, and went back cured. Mrs. *Fairweather* of *York*, having long been troubled with a Swimming in her Head, finding no Relief from the beſt Advice and Means, till ſhe came hither, and met with a very acceptable Cure. The Lady *Hoyh* of *York*, after ſhe had born four Children, in her *5th* was taken with a Swelling, Redneſs and Knobs in her Face, about the Eleventh Week after Conception; the Pain whereof was ſo great, that ſhe miſcarried of this, and two other Conceptions ſucceſſively: After ſome Years ſpent in this languiſhing Condition, Phyſick availing nothing, ſhe came to this *Spaw*, was cured, and had ſeveral Children after. Mrs. *Sadler*, the Daughter of that Famous Lawyer Sir *Edward Coke*, came hither for a long and violent Pain of her Head, and found Relief.

But now for a few Inſtances of the Sulphur-Water Cures.

Mr. *Fowles*, an Advocate in *Edinburgh*, aged fifty one Years, from a Weakneſs and Relaxation of the Solids, had loſt that theſe noble Fountains ſhould ſink in their due Reputation. And indeed, this will not be the Fate of this only, but of all our other moſt Celebrated Waters, in a little time, theſe Places being no longer the Hoſpital of Invalids, but too often the Rendezvous of Wantonneſs, and not ſeldom, of mad Frolicks; which ſhould be the ſhame of human Nature, and all rational Minds, as they are the Contempt

the Uſe of both Hands, and all his Limbs; after a Months drinking of the *Spaw*, and bathing in the Sulphur-Water, was perfectly cured. The like Cure in the Palſie they performed upon Sir *Thomas Vavaſor*'s Lady. *Maud Bogg* of *York* had a prodigious ſwell'd Leg for many Years, which made her perfectly lame; ſhe was cured in three days, by drinking plentifully, and waſhing in this Water. Another poor Man, of a long and very hard Swelling on his Knee, which was cover'd over with thick, long and ſtrong Hair, and had given the defiance to all other Applications; he came hither, bath'd the Part often, and drank freely of this Sulphur Water, the Tumour broke and diſcharged incredible Quantities of Worms, and he ſoon after returned home perfectly cured. Another poor Woman it cur'd of a large Swelling in her Breaſt. One *Smith*, a Shoemaker in *York*, was ſo overrun with the Scurvy, that his Life was in danger, Medicines being of no ſervice, was prevail'd upon to drink the Sulphur-Water at home in the middle of Winter, which cured him in a Month. There is nothing more common, than for People to frequent this Sulphur-Well, and get cured of their Ulcers and Sores, by waſhing in it. What are its inward Uſes we know not yet.

There is alſo a dropping petrifying Well, which cures Fluxes of the Belly; Inſtances whereof we have ſeen. May not *Knaresburgh* challenge all *Europe* for variety of uſeful Springs? If ſome from Prejudice and Peeviſhneſs, will ſay, that ſome have gone there, and reaped little or no Benefit, I anſwer, 1. All Diſtempers are not curable. 2. Did they take and follow proper Advice for a ſufficient time? 3. Did they uſe that Water, which was moſt ſuitable to their Caſe? But, be ſure, let Strangers that come for their Health, take the following neceſſary Rules along with them: Firſt, take the Advice of ſome ingenious Phyſician, who is a Judge of the nature and properties of thoſe ſundry Waters, and the Patient's Caſe. 2. For a day or two uſe ſuch Preparations as he ſhall judge moſt convenient. 3. Be regular and moderate in Diet during the Uſe of thoſe Waters. 4. Suit the degree of your preſent Heat or Cold to the preſent Seaſon of the Weather. 5. Be armed with Patience to wait the Iſſue of thoſe Waters for a convenient time, which is ordinarily a Month. 6. If the Waters work kindly, do not mix them with any other Phyſick. In other things, let them conſult Dr. *Deane*'s *Spadacrene* above. Our *Spaw* can in Juſtice yield to none in *England*, for the great Conſequence and Variety of its Springs, there being a great many ſorts within two Miles of one another. Had they but one Year ſuch an ingenious Examiner as Dr. *Jordan*, we might expect Nations to flock to them. Their Situation is barren; neceſſary Conveniencies and Accommodations are wanting. It might be reaſonably expected, that ſome cleanſed Leper would have ſome Acknowledgment and Gratuity for their Cure, by the Hand of bountiful Heaven; eſpecially when Phyſick had failed. Means had proved ineffectual, Health loſt, and Life in great danger, and the preſent Days miſerably ſuffering. And ſure, here is Occaſion enough for Charity: 1. For providing neceſſary Conveniencies at the *Spaw*. 2. For the Relief of ſuch Poor as come for Health, and muſt therefore

Contempt of ſober Men. That Temperance, Moderation, and a ſtrict proper Regimen, which People were then willing to comply with, are now turn'd to Ridicule. Hence the poor People of mean Circumſtances, and ſuch as have the Fortune to board in clean poor Peoples Houſes, moſtly find Relief; but the Rich ſeldom. Luxury, Intemperance, unſeaſonable Hours, Idleneſs, and Gratification of Taſte and Appetite, are become ſo faſhionable. Before, ordinary People could afford to ſtay at moderate Expences, till they got well: But now it's become ſo chargeable, that the greateſt part cannot poſſibly ſtand it any time, without injuring themſelves and Families. After Drs. *Bright*, *Hunton*, *Dean*, and *Stanhope*, Dr. *John French*[c] was its next Patron; who examin'd it, and celebrated its Praiſes

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live here upon Charity, or ſtarve, and for theſe only. 3. Many Pariſhes hereabout have not Divine Service above once in a Year: Some Encouragement for frequenter Preaching might do well. *Finis*.

[c] The *Yorkſhire Spaw*: Or, a Treatiſe of Four famous Medicinal Wells, *viz.* the *Spaw*, or Vitrioline Well; the ſtinking, or Sulphur-Well; the dropping, or petrifying Well; and St. *Mungo's* Well near *Knaresburgh* in *Yorkſhire*; together with the Cauſes, Virtues and Uſes thereof. By *John French*, M. D. 1654, 12°. p. 134.

Ch. 1. As this Town was formerly famous for its invincible Caſtle, built upon a craggy Rock; ſo is it now, for its Four notable Medicinal Springs, firſt wrote upon by Dr. *Dean*, who mentions Five, but they are only Three: For tho' the Sulphur-Waters are all the ſame, yet he makes them Three, and rejects St. *Mungo's* Well as an uſeleſs and ſuperſtitious Relict of Popery; which has of late, however, regain'd its Reputation; and therefore deſerves a Place among the reſt. The nature of that Country, eſpecially South-Weſt, is very Rocky, yet Mooriſh and Healthy, conſiſting of an unctuous, bituminous Earth, which the Country-People dig up in Turf and Peat, dry it, and burn for Fewel. Dr. *Dean* has given us before, the ſundry ſorts of Earth, Stones and Minerals hereabout.

Ch. 2. Is on the Origin of Springs in general; where he rejects their Opinion, who derive their Firſt from Hail, Rain, Dew and Snow. 2. Theirs, who ſay, they are generated in the Bowels of the Earth, from Air, &c. But 3*dly*, he cloſes in with them, who derive them from the Sea, by ſubterranean Channels. But Heat being altogether, and abſolutely neceſſary for rarefying Water into a Vapour, and there being much Heat requiſite to the raiſing much Vapour, he enquires, firſt, whence this Heat proceeds not. 2. Whence it ariſes, And 1. It's not from the Sun, ſeeing its greateſt Heat in the warmeſt Climate is found by Miners, never to penetrate above ſix Foot deep at moſt. Nor 2. From an Antiperiſtaſis of the cold Air in the ſurface of the Earth: For this has no place further than the warming Force of the Rays come. But to know truly from whence this Heat proceeds, he examines, firſt, the Cauſe of Heat in the the Hot Baths. And this is neither from the Heat of the Sun, nor from the ſtrugling of Winds in the Channels of the Earth; nor from Sulphur, nor *Calx viva*: For the firſt heats not, except it be actually hot; nor the laſt, except when it is diſſolving in Water: Nor is it from the Fermentation that's in the Generation of Me-

Praiſes, in Writing, in 1650,—r. but the Troubles in the North gave him ſome Uneaſineſs.

Metals and Minerals, cauſed by the agent Spirit acting upon the patient Matter, and ſo producing an actual Heat: For when the Metal is generated, that would ceaſe, and never return, except the Ground be firſt digged and wrought up, and new ſpace and room made for a new Production of the ſame. 2. Should the Generation be longer continu'd, their Extenſion muſt ſtill be further, whereby the Hot Bath muſt often be ſhifting. Again, were this Cauſe true, then wherever are Metals and Minerals, there would be Hot Baths; which is falſe. But beſides, how is the crude metalline Matter, previous to any Fermentation, ſublimed from the central Parts of the Earth towards its Surface, if not by a ſubterranean Heat? But hot Springs are from a Fire, which burns in the very Cavities and Caverns of them; theſe Cavities themſelves conſiſting of a bituminous Matter, kindled in Water, and feeding the Flame; and this is after the ſame manner as Diſtillation, or boiling of a cover'd Pot, where the Water riſing up in Vapour, is again condenſed into Liquor; with theſe differences only, that in the laſt two the Fire is under them, and without them; but in this, the Fire is within the Cavity it ſelf, through which the Water paſſes, either in its Bottom, or ſticking to its ſides. This Fire forces the Water into Vapours; which aſcending through the Crannies, Veins, and Fibres of the Earth, there it is moſtly turned to Water; and with the reſt of the Vapour break with hot Fountains full of Spirit; which ſeem to boil, except the Fountains be pretty remote from the Caverns, and then it's only tepid, or warm, *&c.* and their Waters have not ſo bituminous a ſmell. Now, that the Matter of this Fire may neither be temporary, nor ſhift Places, this *Bitumen* is perpetually generating, while there is Moiſture and Dryneſs in the Earth, juſt as Metals are renovated in the ſame places. 2. The Sulphur and *Bitumen* being melted by the Fire, follow the *Flamen*, ſo as it ſtill keeps in one place. The Waters have neither Taſte, Smell nor Colour of *Bitumen*, being heated by Rocky Earth, *&c.* heated (I ſay) by the Fire under them. But if they come immediately from the *Bitumen*, they have its Taſte and Smell. The ſubterranean Fire has no want of Air: For there is great plenty of it under Ground; therefore will *Ariſtotle* have all Springs generated of it. Neither is Air the Aliment of Fire; but unctuous Vapours, which ariſe from the burning Matter, the Smoke and Fumes whereof being ſubtil, recoil not upon the Fire to choke it; but either penetrate and ſhale through the Surface of the Earth, or incorporate again with ſome ſuitable Subjects in the Earth. This cannot ſeem incredible to ſuch as believe the Credibility of Sepulchre burning Lamps 3. The Fire is in proportion to the Vent and Exhalation; where theſe are great, it's great, *&* *è contra*. This *Bitumen* is kindled by hot and dry Exhalations ſhut up in the Bowels of the Earth, which wanting Vent, are agitated, attenuated, rarefied, take Fire, and fire this *Bitumen*.

Ch. 3. Treats of the ſtrange Variety of Fountains, and other Springs.

Ch. 4. Of the Nature and Virtues of Simple Waters; of its inward Uſe, either as curative, or preventative of Diſeaſes; and ſo comes to the outward Uſe of both warm and cold Water. Bathing in the laſt was uſed by the Ancients, by way of Exerciſe, for Swimming, which Lord *Verulam* ſays, makes the Fleſh hard and compact, conducing to Long Life. This is uſeful for aſtringing the Body, and condenſing it, when the Pores are too open, whereby it excites an Appetite and good Digeſtion, promotes Evacuations, repreſſes a canine Appetite, ſtops Hemorrhages, and a Gonorrhœa, cures a

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135 To find out the Nature and Differences of theſe two Chalybeates, I made the following Experiments on them, and the Allum-Well Water, eſpecially, as Dr. *Stanhope* had preferr'd and adviſ'd the Uſe of the Sweet Spaw to the former: Therefore a narrower Inſpection of both was neceſſary, that we might thereby diſcover on which ſide Truth laid. As to their Situation, the *Tuewhet-Spaw* lies a quarter of a Mile South of the Sweet Spaw, and at leaſt twelve Yards lower, in a Bottom between two Hills, very cloſe upon its impregnating Minerals. This Bogg, where it is, might quickly be drained, and dry Walks made near it, at ſmall Expences. Its

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Hydrophobia, and ſeveral ſorts of Fevers. But Youth and Old Age muſt not uſe it: For it prevents the Growth of the firſt, and extinguiſhes the languid Heat of the laſt. It alſo chills delicate and tender Women too much. Nor is it fit for ſickly Perſons, except they are of ſtrong Conſtitutions, and the Humours concocted and fit for Evacuations, and none of the Noble Parts diſeaſed or unſound. If you bathe for Cooling, and not Moiſtening, anoint the Body with Oil before you go in. *Thermæ*, whether tepid, warm or very hot, are all good in different Intentions: For the laſt rather dries than moiſtens, contracts the Skin, and condenſes its Pores. In this caſe therefore, it is proper where the Cold Bath may not be ſuitable. The moderately warm is uſeful and neceſſary in ſundry Caſes: It draws from the remote internal Parts, digeſts hot Vapours into Humours, dilates the Pores, and makes way for the Diſcharge by the Skin. It moiſtens a dry Body, is therefore good in Hectic Fevers, Itch, Scab, *&c.* attracts Nouriſhment to the extreme Parts, where it came not before, by reaſon of ſome Obſtructions. It allays the Sharpneſs of the Humours: In all which caſes it is as much, or rather more effectual than any other Phyſick. Tepid Baths cool and heat at the ſame time, and anſwer the ſame Deſign as Hot Baths, but more remiſsly. Sitting in warm Water up to the Navel, relaxes and ſoftens the Hardneſs of the Belly, provokes Urine, mitigates Pains of the Stone and Cholick.

Ch. 5. Brings us to the ſeveral kinds of Minerals in Mineral Waters; and theſe are chiefly Four, *viz.* Metals, Minerals, Stones, and Earth; and of theſe, ſometimes the Vapours only are mix'd, and ſometimes the Juice only, whilſt they are *in principiis ſolutis.* Laſtly, the Subſtances themſelves, in a threefold manner: For 1. Some are ſo united to the Water, that they can never be ſeparated: For in Decoction or Diſtillation they riſe and diſſipate, or are collected with the Water, ſtill conſtituting but one Form. 2. Some are confuſedly mix'd, and ſeparable by Precipitation. 3. Some have an Union betwixt both, as Salt. The Reaſons of this Mixture, are firſt, the difference of the Heat that ſhould unite; or, 2. Of their Continuance together; or, 3. Of the Aptneſs of the Things to be mixed.

Ch. 6. As to the Origin of Vitriol, and Vitrioline Waters, their difference and different Operations. Vitriol is an eſurient Salt of the embryonated Sulphur of Copper, or Iron; which attracting an Acidity from the Air or Waters, is thereby open'd or reſolv'd, and then corrodes the Parts of the ſaid Metals, with which it's connate; the Body of which Compound conſiſting of pure Metal, and ſuperfluous Sulphur and Salt; being thus open'd, is diſſolved in Water, paſſing through the Veins of the Earth; and this

Its low Situation ſcreens it from the chilling Blaſts. A pretty Bowling Green might be made here, and little Houſe for Shelter in Rain. The Sweet *Spaw* lies North of this, on the top of the Hill. As it has the Advantage of a finer and larger Proſpect; ſo it's more expoſed to Wind and Weather. The Ground about it is wet; the impregnating Minerals are weaker, and lie much deeper. The firſt
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this Water thus impregnated, is boil'd to Vitriol. By imbrionated Sulphur we underſtand a ſuperfluous Sulphur; which is not the Matter of the Metals, but only connate with them, and after the Perfection of the Metal, is in part caſt off by Nature, and more fully by the Refiner's Fire. By eſurine Salt, we mean, a certain Acid Vapour, applicable to all Metals and Minerals, and connate with them in their *principiis ſolutis* and Embryo's, but eſpecially with Iron and Copper. To illuſtrate the Nativity of Salts, let us attend to the Chymiſts Proceſſes in preparing artificial Niter and Vitriol, *viz.* Salts ariſe from an acid ſubterraneous Spirit corroding the Veins of Iron or Copper; which being thus reſolved or open'd, are by the Water that paſſes thro' them diſſolved. The Cauſes of *Spaw*-Water of Vitrioline Taſte and Odour, are their Participation, either of corporeal or ſpiritual Parts of the Vitriol; the firſt being evaporated, leave a Vitriol at the bottom. A Spring of this Water he found two miles from *Knaresburgh*. Of theſe there are two ſorts: For ſuch as contain much Vitriol of either Copper, or Iron, or both, purge moſtly, and ſometimes vomit: their Operation being much like that of Steel, cauſing the firſt day a Nauſeouſneſs in the Stomach, purging all the while it's drunk; but its harſhneſs prevents its paſſing the Veſſels of the ſecond Concoction. But ſuch as contain little of the Subſtance, and much of the Spirit, paſs the Stomach, Liver and other Veſſels far ſooner and eaſier than the Former. Such as contain only the ſpirituous Parts and Virtues (as that near *Knaresburgh*) are more effectual in curing Diſeaſes, if not occaſioned from obſtinate Humours, and confirmed Obſtructions of the *Viſcera*. Theſe Waters cannot be carried far; but ſuch as contain more of the corporeal Parts may.

Ch. 7. *Knaresburgh-Spaw*-Well lies a Mile and half from the Town Weſtward, in a Mooriſh Boggy Ground: The Water has a Vitrioline Taſte and Odour, much like the Ultramarine Spaws. The Spring riſes directly up from the ſandy bottom; juſt as Pipe-water, being obſtructed, burſt the Pipe, and forcing its ſelf thro' the Earth's ſurface, riſes like a Spring. For at this Well, the ſubterranean Veins are either terminated, obſtructed, or too weak to contain the Water of the Spring paſſing forcibly through them: It makes a Vent where it can. Its Taſte and Odour may be imputed partly to thoſe Vapours that proceed from the Fermentation that is in Iron and Copper-Mines; partly to the long continuance of the Water with the Iron or Copper Mine, whereby it receives their Odour, like Water ſtanding long in an Iron or Copper Veſſel; or its being actuated with ſome ſubterranean ſulphureous Acidity, and in a ſpeedy courſe corrodes Iron. On this Water he made the following Experiments: 1. Powder of Galls made it as red as well-coloured Claret-Wine, when cold; but if heated, or boiled, Galls tinged it no more than common Water. He attempted to extract the Spirit alone from this Water in a Glaſs ſtill; bui was diſappointed, as all others have been, and will be. 2. He filled with this Water two Phial-Glaſſes, containing equal Quantities; one he put in a Skellet of warm water, juſt to take off its Cold; the other he kept cold; then put Powder of Galls into both: Their red Tincture were the
ſame.

riſes up into a round Stone-Baſon, which contains about twenty Pints of Water, riſing up through a Hole in its Bottom. On the South, Weſt and North Sides of it is a Wall of a Foot height, open above, being, moſt probably, the very Baſon that Mr. *Slingsby* made for it. The Rivulet on its South-ſide being neglected, was filled with Sludge and Moſs, and poured its Water into this Baſon, whoſe Stream was alſo damm'd up below with Moſs, Sludge and Oker. The Water alſo drained into this Receptacle from a great part of the Bogg above; ſo that it was a conſiderable time before I could get it opened to give Vent to the ſtagnant Water, which was up to the top of the

ſame. 3. He filled two Phials with freſh water; one he ſeal'd with Wax, the other he let ſtand open: After two days, he tried both with Powder of Galls; the uncork'd one was of a fainter colour than the other. He knows not how much of its Tincture it will loſe by carrying far; but thinks it worth while to try: For as its Tincture decays, ſo do its ſtrength and Spirits. 4. A Glaſs of this Water well waxed, when it had ſtood ſeven days, then pour'd out on Powder of Galls, gave a Tincture like ſmall Beer. 5. This Water coagulates not Milk, like the *German Spaw*, and another Vitrioline Spring in the ſame Moor: The reaſon whereof is not from its want of, or leſſer Acidity; For it has more of that than the Water of the dropping Well, which cruddles Milk boiled with it; but becauſe its Acidity is not fix'd and permanent, but volatile, and quickly exhales. 6. This Water kills Worms, Frogs, and other ſuch like ſmall Animals, whether they creep, or are put in it. 7. The Water, when evaporated, leaves no Vitriol, only an inſipid darkiſh Earth. The Scum on the ſurface of its ſtagnant water is alſo Earth, when dried. Our Author, with *Heer ab Heers*, ſay, that this Scum ſtands on all ſuch Mineral Waters; and being dried, and thrown on the Fire, flames, and gives a ſulphureous ſmell. 9. When Glaſſes filled with this Water, become turbid, and are cover'd with Miſt, it's a certain ſign of Rain enſuing. 10. This Water is ſtrongeſt of the Mineral Spirits in Froſt, and in Summer it's ſtronger in the Morning than at Night or Noon, and weakeſt in Rainy weather: For in the firſt Caſe, the Froſt binds up the Earth that the Spirits exhale not. In the ſecond, the Coldneſs of the Night condenſes the Air and Spirits; but the Sun's Heat rarefies them. In the laſt, the Water ſinks into the Veins of the Springs; but trenching of it deep, (but not ſo deep, as to cut any of the Veins of the Spring) round the Well, would carry off both the Rain water, and drain the Boggs, which ſink into the Veins of the Spring, and corrupt its Water. This would much improve the *Spaw*.

Ch. 8. Treats of the Virtues of this Well, and in what Caſes or Conſtitutions it's profitable or hurtful. The Water cools and moiſtens actually, but dries and heats potentially; whereby the Diſeaſes of the Body, which flow from an Exceſs of theſe Four Qualifications are temper'd and reduc'd. It alſo cuts, diſſolves, attenuates, and abſterges viſcous tartarous Humours in the Stomach, Myſentery, Hippochonders, Reins, Bladder, &c. and expels them by Urine, being very diuretic, and conſequently opens Obſtructions of thoſe Parts, which occaſion moſt Diſtempers there. It penetrates the ſmalleſt Paſſages of the Body, where no other Medicine can come. It corroborates, aſtringes and relaxes; yet its Reſtriction occaſions the Retention of nothing that ſhould the Wall above the Baſon. The Oker in this *Spaw* is much deeper coloured, heavier, in larger quantity, and of a more ferruginous Taſte, than that in the Sweet *Spaw*, which riſes out of a Gravelly Moſs, covered with Heath and Graſs; under which is much Shale, with a Mixture of Iron-ſtone: For theſe communicate the impregnating Principles to this Chalybeate. It ſprings up into a Stone-Baſon, containing about eighteen Pints, ſurrounded by a Stone-Wall four-ſquare, covered with a pyramidal Roof, ſupported by four Pillars, each a Foot and half high, ſet on the Corners of the Wall, which is about two Foot high. On the top of this ſmall Pyramid is a Stone-Knob or Ball. The Situation is in a Ruſhy moiſt Ground: It's ditch'd round, both to drein the Earth, and prevent

ſhould be evacuated; and by Relaxation evacuates nothing that ſhould be retain'd. It dries nothing, but what is too moiſt and flaccid; it heats nothing, but what's too cold, *&* *è contrà*. Tho' no doubt, there are ſome Accidents and Objections to the contrary; yet they may be eaſily prevented or anſwer'd, ſo as they ſhall generally hold. It's therefore ſovereign in the following Diſeaſes; it allays all acid, gnawing and hot Humours, and cures all Symptoms proceeding therefrom; as, Agues, Conſumptions, Quinſies, Tumors, Impoſthumes, Ulcers, Wounds, *&c.* It ſtops Bleedings, Overflowing of Bile, Dyſentery, and ſuch like Fluxes. It ſtrengthens the Brain, Nerves, *&c.* and prevents, or cures the Apoplexy, Epilepſy, Vertigo, inveterate Head-ach, Madneſs, and all ſuch Symptoms, as proceed from the Weakneſs, Coldneſs, Heat, Dryneſs or Moiſture thereof. It ſtrengthens the Stomach, and cauſes good Digeſtion, conſumes Crudities, which are the Cauſes of Obſtructions. It makes the Lean fat, the Fat lean. It cures, and prevents Cholic and Worms. It ſtrengthens and opens the Lungs, Liver, Spleen and Myſentery. It cures difficulty of Breathing, Aſthma, Dropſy, Melancholy, Hypo, Wind and Vapours. It chears the Heart, cures Palpitations, Faintings and Paſſions thereof. It purifies the Blood, cures the Scurvy, Leproſy, Venereal Diſeaſe, Yellow and Black Jaundice, and opens the Hæmorrhoids in many. It provokes Urine, and cures the ſharpneſs and ſuppreſſion of thereof; diſſolves the ſuperficial Parts of the Stone in the Bladder, and carries off the mucous Water wherewith it is mix'd. It expels Sand and ſmall Stones quickly. It cures bloody Urine and a Gonorrhœa; cures all Ulcers, eſpecially thoſe of the Reins and Bladder. It cures the Gout, Aches, Cramps, Convulſions in any part of the Body, ſpeedily. It opens all Obſtructions, and ſuppreſſes all ſuperfluous or exceſſive Uterine Evacuations; is a hearty Friend to the *Matrix*, cures Sterility, and prevents Abortion, heals all other Uterine Infirmities. But note, this Water cures not all theſe after the ſame manner; but ſome *per ſe*, as it paſſes along, either by its groſs, or ſubtil Parts, or by Accident, when the Diſeaſe is by conſent. Beſides drinking, it's alſo uſed by Infuſion, for Griefs of the *Uterus*; and by Injection, in Pains of the Bowels and Bladder, from ſharp and hot Humours. It's alſo uſeful in Fomentations and Lotions, in Wounds, Ulcers, Itch or Scab. Dropt into the Eyes, it wonderfully dries, cools and clears them. In a word, I have either ſeen it ſucceſsful, or had ſatisfactory Evidence from ſufficient Eye-witneſſes, that it has either come up to, or outdone all Medicines, in opening Obſtructions, evacuating ſuperfluous morbific Huother Springs getting in. The Encloſure within this ſquare Ditch, is about fifty two Yards every way. At its Eaſt and lower End is a neceſſary Houſe for the Drinkers to retire to. In the upper Weſt Corner have formerly been Seats of Earth for the weak or weary to reſt upon. It's a large half Mile South-Eaſt of the Sulphur-Wells, and a quarter of a Mile from the Village. This Well was not known till ſixty Years after the other was diſcover'd. Its Oker is leſs, of a lighter colour, and not ſo ſtiptic as that of the other. The Baſon, and Houſe over it were built in 1656. This Water, by ſtanding a Night in an Earthen Mug, became black, and threw up a ſtrong blue

mours, and corroborating all the Parts of the Body, and ſeen it perform moſt of the foreſaid Cures. Children of a Year old (if their Stomach can bear it) may drink moderately of it with ſucceſs. The like may be ſaid of old People, if it pall not their Appetite. Women with Child ſhould not be too buſy with it. But if there is neceſſity, they may uſe it ſparingly for the 4th, 5th, and 6th Months, and all other times of Gravidation, very cautiouſly, and in ſmall quantity, ſtill ſwallowing ſome Reſtringent the Night before, to prevent Miſchief. The blackneſs of the Drinkers Feces is neither from *atra bilis*, nor Iron only, but from the Vitriol forged in the Body, from the Acid Spirit thereof, diſſolving the eſurient Salt of the Iron, and corroding it into Coperas.

Ch. 8. Contains general Directions to be obſerved before, during, and after the Uſe of the Waters. Firſt, it's neceſſary to purge before, that the Waters force not the groſs Humours in the greater Veſſels into leſſer Tubes, and ſo generate greater Obſtructions, and obſtinate Diſeaſes therefrom; as, Fevers, Dropſy, Gripes, *&c.* By this means alſo Nature being unburden'd of a Load of groſs Humours, will be able to aſſiſt the Waters to come, digeſt, and evacuate the thinner that remain; and ſooner recover its natural Strength and Health. But the Purges ſhould be appropriated to the offending Humours, as well as adjuſted to the Patient's Strength and Conſtitution; and therefore moſtly (no Symptoms forbidding) Vomiting, or a Doſe of *Hiera Picra*, and ſome Lenitives after, to open the Paſſages of the Belly are neceſſary; or Bleeding, if the Perſon is full of Blood, or liable to Hæmorrhages. If the Obſtructions are obſtinate, he adviſes firſt to a Courſe of Chalybeates. And when they are come to the *Spaw*, give a gentle Vomit; next day, and the Morning after that, a gentle Laxative: Then begin to drink the Water chearfully, with a Reſolution to obſerve all neceſſary Rules preſcribed. But the Poor, who cannot buy Phyſick, moſtly begin three or four Mornings with the Sulphur-Well, which anſwers the ſame Deſign. But ſtill, after all Directions, the Advice of a Phyſician acquainted with the Nature and Effects of Mineral Waters, and of theſe in particular, is firſt of all neceſſary. Theſe things premiſed, let the Drinker begin with five or ſix half Pint Glaſſes of Water, and more, as his Stomach can bear; and ſo daily add two or three half Pints more, till it become oppreſſive and nauſeous to him. Some can bear ten, others twenty, and not a few, thirty half Pint Glaſſes. But be ſure you have had a Stool every Morning before you begin to drink: For the Excrements retained, hinder the Concoction of the Water, and its Paſſage thro' the Body. Hence Preſſures, Fluctuations, Tenſions, Gripings, and ſometimes cold Sweats. It's alſo fit between every three or four Glaſſes of the Water, to uſe ſome Exerciſe, that they may blue Scum. Both Chalybeates mix, or boil with Milk; but cruddle Soap, and raiſe no Lather, except the Water is taken up, and let ſtand thirty Hours in an open Veſſel; then they are fit for common uſe, and will bear Soap. Both Springs made the Spirits in the Thermometer ſubſide three eighths of an Inch below common Water. The *Tuewhet-Spaw* riſes up Eaſt; the ſweet *Spaw* South, or South-Eaſt; the Water of both is of a bluiſh clear Colour: The ſmell of the firſt is more Inky than that of the laſt. The Taſte of the firſt is very rough, reſtringent, and Irony; ſo as the laſt taſted inſtantly after it, ſeems ſweetiſh, nothing ſo harſh and rough. The firſt, when the

may paſs off ſooner and eaſier: and to eat ſome ſtomachic candied Spices, as, Orange or Citron-peel, Angelica-root; but Elecampane candied is beſt of all; next is Carway, or Coriander-Comfits. Drink not the Water too faſt, nor limit the Doſe to too ſhort a time. Firſt of all, uſe a little Exerciſe; then drink three or four Glaſſes, walk half an hour, then drink again, and walk again; and laſt of all, uſe Exerciſe, till the Water is wholly gone out of the Body, But if any find a fourth part too much, let one eighth part ſuffice, and take a quarter of an hours Exerciſe: For if the Water is drunk too quickly, it cauſes *Nauſea*, oppreſſes the natural Heat, compreſſes the Veſſels and Paſſages, that the Water cannot get off ſo freely as it otherwiſe would; but occaſions frightful Symptoms, as, ſwelling of the Belly, Proſtration of Appetite, cold Sweats, &c. The time of drinking muſt be proportioned to the ſtrength of the Diſeaſe, and Benefit received. In caſe any Perſon, after ſundry Attempts to drink the Water, finds ſtill a Return of thoſe laſt Symptoms, he muſt preſently forbear. If one finds the Waters produce no ſuch Effect, but yet he is ſtill the ſame, as to his Diſtemper, let him not deſpair, and give over, but continue a Month or two. In *Germany* they ordinarily drink them three or four Months together, and not ſeldom ſix or twelve Months, and at laſt are cured, when moſt deſpaired of. Therefore do many *Engliſhmen* miſs of their Cure, by being too haſty, and allowing too ſhort a time (as a Month) in drinking the Waters, and if not cured then, conclude the Waters are not fit for them. It is alſo proper, every 8th or 10th day to take a Purge (both to carry off Crudities, and the groſs Humours lately attenuated and diſſolved) of *Hiera Picra*, &c. and the Lenitive Electuary the next day after it, to moiſten the Bowels, and prepare the Paſſages. Some Caſes require a daily Lenitive. Some People are averſe to Phyſick, becauſe they have ſeen it unſucceſſful; but the Phyſicians attending might be ignorant of the nature of thoſe Waters, or wanted to crack the Credit of the Spaw, or were afraid the Patient ſhould get too ſoon well; or the Drinker might be backward in complying with neceſſary Rules.

Ch. 10. Contains ſpecial directions in particular Caſes, &c. Such as have good Appetite and Digeſtion, may, four or five Hours after dinner drink half the quantity of Water they did in the Morning, provided they eat either no Supper, or a very light one. But ſuch as have a weak and cold Stomach, muſt either wholly deſiſt, or drink only one Glaſs for dilution. Such as drink it for Agues, ſhould take care ſo to time it, that the Water ſhall be carried off before the Fit begin, that Nature be not perplexed in her Motions between Sweat and Urine. Such as have continual Fevers, muſt forbear it, till the Humours are fit for Evacuation by Sweat, or Urine. Let ſuch as have a weak and cold Stomach, warm the Water. If the Baſon is full, weighs ſixteen Grains in a Pint lighter than common Water. But the Baſon laded, and the freſh bubling-up Water weighs thirty two Grains in a Pint lighter than common Water. The laſt was only four Grains in a Pint lighter than other Water; and the Baſon laded, it was twelve Grains lighter than common Water. The firſt throws out about thirty Gallons of Water in an Hour, the laſt, ſixty Gallons in an Hour.

136. The

Water be ſhut up, either in his Stomach, Bowels, or whole Habit; the firſt is plain from an Inclination to throw up. Here give *Hiera Picra*, or Rhubarb. If in the Belly, it cauſes a Rumbling, Wind, Tenſion, and Oppreſſion: Here uſe Glyſters. If in the Habit, there is Chilneſs, Swellings and Oppreſſion: Hydragogues will carry it off Such as drink, but are too feeble to uſe Exerciſe, and therefore retain the Water, may either drink all, or part of it in Bed: For it often works better in Bed than up, the Heat thereof taking off the Contraction from the Water; and either relaxing the Parts, or facilitating their Relaxation. To render the Uſe of the Water more effectual, Medicines ſuitable to the Diſtemper may be uſed; as in the Stone, a ſpoonful or two of Saxifrage-Juice given in the firſt Glaſs, or Turpentine-Pills, or a Bolus of Turpentine and Caſſia over Night: And in very great Obſtructions, or Dropſy, Steel-wine with the firſt Glaſs, and drink no more of an Hour after. To make the Water go more quickly off, the firſt Glaſs may be mixt with Syrup of the five Opening Roots, or Syrup of Liquorice, or *Sal Nitri*, or Spirit of Salt, or Salt of Tartar; or mix the Water with a Glaſs of White or Rheniſh Wine, or two or three Glaſſes firſt every day of the Sulphur-Well, or a Decoction of Fennel, or Parſley-Roots before you begin the Water; all theſe being penetrative and opening of the Paſſages. But where any of theſe Mixtures are neceſſary, they ſhould never be uſed without the Advice of a Phyſician, who is a Judge of the Waters, and the different Conſtitutions and Diſeaſes of human Bodies. Should the Water fly to the Head, and in a manner inebriate the Drinker, let him take Pouder of Nutmeg and Coriander in every fourth Glaſs of Water. *Queſt.* Whether will drinking this water cure Pimples and red Fluſhings in the Face? *Anſw.* The drinking often makes them worſe; yet they may, with Caution, be cured by it thus: Let the Patient drink ten or twelve Mornings together of the water: Then let him be purged with cooling Lenitives; then for a week after, drink clarified Whey, made with cooling Herbs and Roots; then let Blood; ſo return another Fortnight to the uſe of the water; then take to the Purges and clarified Whey again for a Month, not neglecting in the mean time the Application of Topicks to the Place, as, Oil of Eggs, Oil of Tartar, Juice of Lemons and Salt, white Ointment; but, above all, Brimſtone diſſolved in Oil. By theſe, and the Waters, the moſt pimpled Face in the world may be cured.

Ch. 11. Treats of the Neceſſity and Effects of Exerciſe. Whilſt the water is in the Body, it excites warmth, accelerates Circulation and Evacuation, promotes Digeſtion, and, if the Patient has ſtrength, ſhould be continued, from drinking the firſt Glaſs, till the whole doſe is drunk, and diſcharged. Riding on Horſeback, or in a Coach, are the beſt Exerciſe. But, in defect of theſe, walking, bowling, or pitching the Bar are next: Yet let not Sweat be provoked on any terms. Weak People may drink them warm in Bed, but not ſleep after. The drinker ſhould neither ſit on the Ground,

ſtand

136 The Sweet *Spaw*, and Allum-Well compared; the firſt, with Solution of Gold was yellow through the Glaſs, but a deep Green, to look above it The laſt was a very light Yellow. With Solution of Silver, both were of a bluiſh white Colour. With Solution of Copper, both were of a clear light Blue. With Tincture of Rhubarb, the firſt was of a Chocolate-Colour, the laſt, a greeniſh Yellow. With Sublimate Mercury, the firſt was whitiſh blue, with a Scum, the laſt a bluiſh Clear. With Sugar of Lead, both were of a clear Pearl-Colour. With Oil of Tartar, both were a bluiſh Clear. With Spirits of Vitriol, Salt, and *Sal Armoniac*, they were a clear bluiſh Colour, and made ſome Ebullition with the firſt two. With Syrup of Violets, they were a whitiſh Blue. With Tincture of Fuſtic,

ſtand in the Sun, nor walk late in the Evening.

Ch. 12. As to the Seaſon for drinking, the fitteſt time is from *May* to *September*. For tho' the Water is ſtrongeſt in Froſt, yet it's an improper Seaſon for ſick People to travel; and the Continuance of Froſt is uncertain. The Morning between ſix and ſeven a-Clock (except to weak People, whoſe early riſing may create a Nauſeouſneſs, and prevent the Digeſtion of Crudities in the Body) is the beſt time of the day. In extreme wet weather, the Water is much weaker than at other times; therefore ſhould not be drunk without Sugar of Iron, or Spirit of Vitriol.

Ch. 13. As to the Diet to be obſerv'd, Intemperance prevents many of the expected Benefits; and the Water exciting a ſtrong Appetite, many People are apt to gormandize; let all ſalted Fleſh be refrained, and Fat, Bacon, Pork, Neats-feet, Tripes, tame Ducks, Geeſe, Gizzards, Eels, Salt Fiſh, and all the Product, and Preparations of Milk, except Butter, Whey and Milk; and alſo Leeks, Onions, Parſneps, Cabbage, Musk-Melons, and Cucumbers; all Variety of Meats, and all Meats dreſſed with delicious Sauces, which both force an unnatural, and prolong the natural Appetite, beyond its true deſires. But no kind of Food ſhould be eaten, till the Urine turns from a clear to a higher colour: For then moſt of the Water is gone off. And for Drink, uſe Ale or Beer, neither too new, old, ſtrong nor ſmall. Let Supper be got ſix Hours after Dinner, and ſup more freely than dine.

Ch. 14. The Sulphur-Well, ſo called from its ſulphureous ſmell, with which it has a ſalt and bitter Taſte. The Salt remaining after the Evaporation of this Water, is of the ſame nature, and indiſtinguiſhable from common black Sea-Salt. Now the ſaltneſs of the Sea is neither, firſt, from the Sun's exhaling its ſweeter Parts, as *Ariſtotle* imagined; nor from the Sun's boyling into the Sea, by the Vehemence of its Heat, that ſaline Taſte, as *Pliny* fanſies; nor 3. is it from the Rain, mixt with hot, dry, and terrene Exhalations, as *Scaliger* ſuppoſes: But it is from the continually burning *Bitumen*, together with the Terreneneſs therewith mixed in the Gulphs of the Sea. The ſame is the reaſon of the ſaltneſs of our Well. as alſo of its Bitterneſs. Its ſtink is deducible from the ſame. The Experiments made on this water were theſe: It tinges Silver, 1. yellow, then black; but diſcolours not Gold. 2. When boiled, it loſes its tinging Property and ſtinking Smell. 3. It coagulates Milk. 4. Its diſtilled water loſes its ſmell and coagulates not Milk. 5. The boiled water coagulates Milk, tho' it has loſt its ſmell.

Fuſtic, both were of a bright Yellow. With Tincture of *Braſil*-wood, both of a finer rediſh Purple. With Tincture of Logwood, both a deep Blue. With Tincture of Galls, the firſt was a dark Red, the laſt a dark Purple. With Tincture of Green Tea, the firſt was a fine Crimſon, the laſt a dark blackiſh Yellow. With Tincture of Red Roſes, the firſt was a purpliſh Black, the laſt a dark Black,

ſmell. 6. Seven Gallons of it evaporated, left a Pound of Salt, black at firſt; but by repeated Filtrations and Exhalations, became very white. 7. This Salt coagulates Milk. 8. The Water preſently kills Worms, or other Inſects put in it. 9. He filled two Phials with this Water in moiſt weather; corked the one, but not the other; within two hours the Water in the firſt became white and thick, and in three days let fall a white Sediment, and the Glaſs-ſides were furred: The Water in the other Glaſs had not thoſe Changes. In fair weather, he repeated this Experiment; the water in neither of them alter'd much; only a ſmall thinniſh white Matter fell to the bottom in three days time. The Waters continu'd clear, and the open Bottle loſt its ſmell. 11. A Pint of this Water was two Scruples heavier than common Water. Its tinging Property is not from a bodily Sulphur, but from the Vapours, or fine *Effluvia* thereof mix'd with the Water. Its coagulating Property is from the Acidity of its Salt, tho' not diſcoverable by Taſte. From this Salt is extracted a very good Spirit. 240 Yards above this *Spaw* is a Bogg of twenty yards diameter, out of which he digg'd a Mineral Subſtance, like Iron-Cinders, but almoſt rotten, being corroded by ſome acid Spirits, whereof the Bogg is full. This Mineral Subſtance, caſt into the Fire, burns blue, and ſmells like Sulphur: It taſtes like Vitriol, and Vitriol may be got out of it; nay, in time, it is almoſt wholly diſſolvable into Vitriol: For waſh it, and ſet it three days in a Cellar, and it is wholly cover'd with a white ſweetiſh Vitriol, which diſſolved in Water, and the Mineral ſet in the Cellar again, was cover'd as before. He repeated this, till it almoſt turn'd to Vitriol. In the ſame Bogg he found three or four ſorts of Waters, *viz.* two Sulphurine, and two Vitriolic; but diſcovering them only the laſt Day of his ſtay there, he had no time for new Experiments; only the Mineral Subſtance he tried at home. He thinks, if the Bogg were dreined, and new Wells built there, it might not only be of public uſe, but perhaps new kinds of Water, and better might be diſcovered. The ſmell of this Sulphur-Well is perceived a good way off, in moiſt and cold weather.

Ch. 15. As to the Virtues and Uſes of theſe Sulphur-Wells, they may be us'd either inwardly or outwardly. If drank, it attenuates, abſterges and reſolves viſcous thick Humours, and irritates all the Veſſels of the whole Body, to expel all the offenſive Humours. It opens and removes thoſe ſtrong and obſtinate Obſtructions either in Men or Women, that would yield to no other Medicines whatever. It often evacuates by Stool great Lumps of viſcous ſlimy Matter, which, no doubt, whilſt in the Body, was the occaſion of ſundry Diſtempers, and which could ſcarcely be removed any other way. It heats, and quickens the Stomach, Bowels, Liver, Spleen, Blood, Veins, Nerves, and indeed the whole Body: So that it conſumes Crudities, rectifies all cold Diſorders in all parts of the Body, begets good Appetite and Digeſtion, cures the Dropſy, Spleen, Scurvy, Green-ſickneſs, Gout, Cramp, Epilepſy, Head-ach, Kings-Evil, and all Symptoms and Diſeaſes ariſing either from Crudities, cold, viſcous, ſlimy, or corrupt Humours, which obſtruct and diſtemper the Stomach, Bow-

Black, with a purpliſh Caſt. With Tincture of *Sumach*, both were a charming Purple. Six Inches under the Baſon of this Allum-Well in the Bogg, lies the impregnating Mineral.

There is another Chalybeate Spring, in the Mid-way between *Kharesburgh* and *Harrigate*, on the South ſide of the Brook, with a Baſon, and a little ſquare Place built over it. With Solution of Gold,

els; Myſentery, Liver, Veins, Brain and Nerves, and thoſe tho' of long Continuance. It infallibly kills Worms. A Courſe of this Water muſt be begun by degrees, and not the full proportion taken at once, but at ſeveral times, with intermediate Exerciſe. The Quantity drunk, muſt be proportioned to the Conſtitution and Strength of the Party, and his bearing it; alſo the Humour offending, the Predominancy of the Diſeaſe, and the Aptneſs of the Body to be wrought upon. Cold, dull Bodies can bear more than others: But, in general, let the Quantity be ſuch as may move the Belly five, ſix or ſeven times, as the Body can bear. This Water often works too quickly upon ſeveral Bodies; therefore ſuch ſhould firſt drink two or three Glaſſes of the *Sweet Spaw*, to retard the too ſpeedy Operation of the Sulphur-water, and keep it longer in the Body, that it may more ſucceſsfully perform its Operation. It will alſo be proper, after he has drunk his full doſe, and it is almoſt wrought off, to drink four or ſix Glaſſes of the *Spaw* water, eſpecially in Choleric Bodies They that nauſeate it on account of its ſmell, but want its Effects much, may boil it a little, till it has loſt its ſmell, then drink it: For altho' it has then loſt ſome of its Virtues, yet the greateſt reſiding in the Salt and ſubtil Acidity, remain. Or, drink its Salt in the *Spaw*-water, it will anſwer, as he often tried. Its Salt diſſolved in Spring-water, and drunk, produces good Effects. The Spirit of this Salt is excellent, a few Drops of it being put into every Glaſs of the *Spaw*-water; for it makes it more penetrative and effectual againſt ſeveral Diſtempers, as, Dropſy, Gravel, Stone, Suppreſſion of Urine, &c. Such as have Inflammations, Excoriations, Ulcers in the Bowels, Kidnies or Bladder, or a ſharpneſs of Urine, ſhould not uſe this Water inwardly; for it increaſes theſe Diſorders. The general Rules for *Spaw*-drinkers are the ſame here; only leſs Exerciſe will ſuit this, and indulge a better Diet. This Water outwardly, diſſolves hard ſwellings, cures old Ulcers, Scab, Itch, Scurf, Leproſy, and ſuch other diſeaſes of the Skin: For by bathing in it, the affected Parts are dried, corrupt Humours conſumed, Putrefaction prevented, &c. Bathing in it warm, conſumes all moiſt Diſtempers, whether hot or cold; as, Dropſy, Gout, hard Tumours, Swellings of the Legs, Leproſy, and the like. It makes fat People lean, reduces them to a natural, dry, firm, healthy Habit of Body; but it muſt be uſed cautiouſly. He thinks, if the Conveniencies for Bathing were as good, the Waters would be every whit as effectual as thoſe in *Somerſetſhire*. The Spirit of the Salt rubbed into any ſwell'd or pained Part, cures it preſently. As the Waters are uſed outwardly for cleanſing and healing; ſo there is a kind of ſlimy bituminous Mud below the Sulphur-Wells, which burns like Sulphur, and is of great uſe in ſoftening, digeſting and reſolving hard Tumours, and for ſtrengthening weak and infirm Parts, and allaying Pains and Aches in the Limbs, be they of whatſoever nature, being outwardly applied. He ſaw a Youth come there, who had a Horn on the top of each Finger, and his Face and Wriſts covered with a horny ſubſtance; who by the inward and outward uſe of this Well, had all his Horns looſen'd, and fall off in a little

Gold, this was a fine greeniſh Yellow; with Solution of Silver, a dark bluiſh White; with Tincture of Rhubarb, a greeniſh Yellow; with Solution of Sublimate, clear; with Solution of Sugar of Lead, whitiſh Clear. The acid Spirits changed not its Colour. With Oil of Tartar, very clear; with Syrup of Violets, a clear Sky-blue; with Tincture of *Braſil*, a reddiſh Purple; with Tincture of Logwood, a dark Inky Purple; with Tincture of Galls, a dark bluiſh; with Green Tea, a dark Purple; with *Sumach*, a tranſparent dark Purple. I took two Wine-Glaſſes of the ſame ſort of Figure and

little time; which ſhould recommend this Water as much to Cuckolds, as the *Levitical* bitter Water was once to good honeſt barren Matrons.

Ch. 16. The petrifying Well, oppoſite to *Knaresburg*-Caſtle, on the Weſt ſide of the River *Nid*, ſprings up in a high Ground; which running a little way in one Stream, is, at the Brow of a Deſcent, by a Damm of ragged Rocks, divided into ſeveral wickling Branches, whereof ſome drop, and ſome ſtream down, partly over, and partly through, a jetting Rock. This Spring is of a petrifying nature, the Rock from which it diſtils, being wholly produced of it, and daily increaſes; tho' Pieces of it are daily cut, or broke off. This Water generates Stones, wherever it falls or runs, tho' not the whole Courſe; but only near the Place where it fell. If Sticks, or Pieces of Wood lie ſome Weeks in it, they are cover'd with a ſtrong whitiſh Cruſt, the Wood in the inſide continuing of the ſame nature as before; but ſpongy Subſtances as, Moſs, Leaves of Trees, &c. which the Water penetrates, become perfectly ſtony and hard. The Cauſe of this petrifying Quality, is a ſtony Matter which is in its *Principiis ſolutis*: For indeed, the Beginning of all Bodies, whether Vegetable, Animal, or Mineral, is in a liquid Form, and concrete by degrees. On this Water he made theſe Experiments: 1. He evaporated the Water, and in the bottom remained a ſtony Powder, like the Powder of the Stones of the Rock. 2. A Pint of it weighs ten Grains heavier than a Pint of common Water. 3. It coagulates boiling Milk, from the ſulphureous Acidity of the Mineral in the Water. Its chief Virtues are, to allay acid, gnawing and hot choleric Humours, and to ſtop all Fluxes proceeding from thence. It's alſo good in conſolidating and cicatrizing of Ruptures, bloody Urine, exceſſive flowing of the *Menſes*, and for weak Backs. Such as drink this Water, and have neither *Diarrhœa* nor Dyſentery, ſhould have a Lenitive Glyſter injected every other Day, or take a Lenitive of *Caſſia*, Manna, &c. every other Night. This Water, in many Caſes, is better than Syrup of Coral; and the Powder of the Rock, or rather of the Water evaporated, may be uſed inſtead of prepared Coral. The quantity of Water to be drunk in a day, is, from half a Pint, to half a Gallon, according to Age, Conſtitution, Diſeaſe, and Place affected: Doſe of the Powder, from ten Grains, to a Dram.

Ch. 17. *Of St.* Mungo*'s Well.* He knows not, whether the Well was Sainted from its real or imaginary Virtues. *Dr. Dean* allows it no other Virtues, than thoſe of common Water. Whence, it ſeems, he was no Papiſt, or he has forfeited this Saint's Favours: For the Dr. found no ſenſible Minerals in it; but they often have, tho' not perceived: For it may contain *Effluvia* of Lead or Tin, which make it both colder, and give it a kind of fermenting Nature, ſo as it ſtirs up a Heat in the Habit of the Body: For

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and Size. I put ſix Drops of Tincture of Galls in each Glaſs, and fill'd them up with Water. That with the *Tuewhet-Spaw* was of a deep Violet-Purple; that with the *Sweet Spaw*, was of a light red Purple: Both became deeper, by ſtanding all Night; but the firſt ſtill kept its Advantage: Nor did ſix Drops apiece more of this Tincture turn them black, when freſh taken up. Two Phial-Glaſſes containing half a Pint apiece, being filled about two thirds full of Water, corked alike cloſe, and ſet in a Pan in ſix Pints of the *Tuewhet*-Well Water cold, and ſet over the Fire, till it was between Milk-warm and ſcalding-hot: Then nine Drops of Tincture of Galls put into each of the above Wine-Glaſſes, and filled up with the hot Water out of the Phials that were in the Pan; the Water of both was near the ſame with that of the *Sweet Spaw*. The ſame Phials, with their Water, corked up again, and ſet in the Pan till the Water boiled; then each poured out into its former Glaſs on twelve Drops apiece of Tincture of Galls, neither of them ſtruck Purple, except you held the Glaſſes down, and look'd on their Surface; then you might perceive a ſmall ſhade. I took a Wine-Glaſs full of each Water new taken up, put twelve Drops of Tincture of Galls into each; then inſtantly precipitated the Vitriolic Principle. The *Sweet Spaw* took double the quantity of the Precipitator to cruddle it, and yet the *Tuewhet-Spaw* had double the quantity of Vitriol of the other. The *Tuewhet* and *Sweet Spaws*, brought home to the *Queen's Head*, in two large, open Oak-Veſſels, and let ſtand one Hour; the firſt

weigh'd

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if a Man bathe or waſh in it a quarter of an hour, when he comes out, he will preſently be very hot, and continue ſo a long time, even in a cold Air, and without his Cloaths. Nay, upon tender Women, who dare not go into other Water, they ſweat toward Morning, if they lie in their wet Linen all Night, whereby they are often cured of old Aches in any part of their Body, and of ſwellings, hard Tumors and Agues, and of many other outward Diſtempers, whether from cold or hot Humours. Such as have tender Heads, and cannot do without many Cloaths upon them, or are liable to frequent ſevere Colds, three or four Mornings waſhing their Head in this Water cures them. However, I would have none to uſe it raſhly, without the Advice of a Phyſician. The Well is built four-ſquare, and has a Houſe by it, to dreſs or undreſs in. The Spring riſes higher in *May*, and falls about *September*. He aſcribes theſe Virtues to it, neither out of Contradiction to Dr. *Dean*, nor from Affection to Popery; for he declares himſelf no Papiſt: But becauſe he ſaw ſome notable Cure done by it; and the Dr. owns great Feats done by it formerly. Suppoſe theſe the Effects of Faith; yet if People were cured, the Means are lawful: Let them ſtill retain a ſtrong Imagination, and reap Benefit by it. *Finis.*

Dr. *Simpſon*, in his *Hydrologiæ Chymica*, p. 136, to 147, gives an Account of the *Knaresburgh*-Spaws, juſt ſeventeen Years after *Dr. French*, as he was twenty Years after *Dr, Stanhope*, and he ſix Years after *Dr. Dean*, and he thirty ſix Years after

Dr.

weighed twenty eight Grains in a Pint heavier than at the Spring; the laſt, fourteen Grains in a Pint. Both of them bubbl'd and ſparkled more at the Spring, when pour'd out into a Glaſs, than they did at home, eſpecially after three or four Hours ſtanding. I took out of a Pan over the Fire, a Glaſs of the *Sweet Spaw*, when the Water was ſcalding-hot, put a little Gall to it, which gave it a very faint Tincture, and that faded afterwards. But the *Tuewhet*-Spaw, uſed the ſame way, gave not the leaſt Tincture. I put half a Grain of ſcrap'd Gall into a Glaſs of the freſh Water, when it had ſtood an Hour in open Oak-Veſſels. Both Spaws were firſt of a light Red, then deeper; but neither became of a true deep Claret-colour, far leſs, Ink-black. I put ſix Pints of the Spaw in a Pan, ſet it on the Fire, with a Phial half full of the ſame Water, and cloſe corked; let the Water ſtand, till it was ſcalding-hot; then took two Wine-Glaſſes, put nine Drops of Tincture of Galls into each; put ſome of the hot Water out of the Pan into one, and ſome out of the Phial into the other; the laſt had loſt very little of its tincturing Property; but the firſt gave no Tincture, more than common Water. I inſtantly corked the Phial again, and ſet it in the Pan, till it boiled

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Dr. Hunton, and he after *Dr. Bright*, who was nineteen Years after Mr. *Slingsby*'s Diſcovery, Uſe, and Recommendation of it.

We deſign to be but brief on this *Sweet Spaw*, *Dr. French* has wrote ſo fully on it lately. This Water has but a ſmall Portion of eſurine Acidity; which having preyed a little upon the *Minera* of Iron; for Powder of Galls put in the Sweet Spaw, turned its Water purple, and in concluſion, Inky; but Oil of Vitriol clear'd it again, and Oil of Tartar muddied it again; but ſtill Oil of Vitriol or *Aqua fortis* clear'd it. Drop Oil of Tartar in ſome of the freſh Water, it gives a white Milky Separation; which, with Oil of Vitriol, after Ebullition, becomes clear again: But any of the Alcaline Salts turn it white, and reſtore the *Coagulum*; but yet may be made clear, by Addition of the acid Spirits. All which demonſtrate, that Vitrioline Solutions undergo the ſame Alterations by the Effuſions of ſundry Liquors, as Aluminous Solutions will do; and that they are, in effect, but the ſame Mineral Eſurine Salt, under various diſguiſes, from Mineral Beds, where they become ſpecificated into this, or the other Salt, from their touching upon different Mineral Glebes. So as, in effect, all Mineral Springs, whether Vitrioline or Aluminous, are the ſame; only ſome Waters are more ſtrongly ſaturated with Minerals than others; as, *Scarburgh* and *Malton* are richer in Minerals than this. The Air here is much preferable to that of *Scarburgh*, eſpecially for weak and tender Bodies; and the choice of Air is one great Article in the Cure of Chronic Diſeaſes. That this *Spaw* is Vitriol, he proves it thus: diſſolve a Dram of Salt of Steel in a Pint of Spring-water; put two or three ſpoonfuls in a Glaſs of common Water, and it has the exact taſte of this *Spaw*: Therefore ſhould its drinkers frequently mix Salt of Steel with the Water, that it may be more efficacious in leſs quantity, in ſhorter time, and ſo pre-

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two Minutes; then try'd it a ſecond time with Galls. On the firſt mixing, one might plainly ſee, it had been a Chalybeate; but in two Minutes the ſhade was wholly gone. The *Tuewhet-Spaw* tried in the ſame manner, gave no ſhade at all. Both times the Corks were taken out of thoſe Phials, they gave a loud Crack; but that with the *Tuewhet-Spaw* had almoſt thrown out its Cork; and when pull'd out, it made a noiſe almoſt like a Pocket-Piſtol. When the Water of thoſe two Springs had ſtood ſixteen hours in open Veſſels, I try'd both again with Tincture of Galls; the *Tuewhet-Spaw* had intirely loſt its Vitriol; the Sweet *Spaw* ſtill gave a faint purple Shade. A Quart Bottle of each of thoſe Waters, being well corked, and ſet in a Pan of Water over the Fire till it was near boiling, then taken out, uncork'd, and ſome of the water pour'd on Tincture of Galls, that in the top of the Bottle ſtruck Purple; but neither that in the middle, nor bottom. A Phial of this Water well corked, and inverted all the while in the water, till it boiled a little, then taken out, and tried with Galls, it did not ſtrike Purple. Another Phial filled half full, well corked, and inverted in the ſame manner, till the water was ſcalding hot, the Water equally ſtruck Purple with Galls. *Tuewhet-Spaw* and Sweet *Spaw* freſh taken up, had equal number of

vent ſeveral Inconveniencies which often happen from ſwilling down large Doſes. Beſides, the *Crocus* of the Steel in that Vitriol, when taken into the Stomach, would precipitate; upon which, the excrementitious Salt, or Tartarous Recrement, that great Obſtructer in many Diſeaſes, would be coagulated, and by the Periſtaltic Motion of the Inteſtines, would be carried off in black Stools. It's from the great quantity of weak Mineral Waters drunk, that the Fibres and Membranes are often ſtretched, weaken'd and relax'd. Hence Cachexies, Dropſies, Defluxions, Rheums, &c. enſue, which the Salt of Steel taken in their Water might prevent: For it aſtringes, and preſerves the Tone of the Bowels and Veſſels. He adviſes the drinkers, before they begin, to take a Vomit or two of Salt of Vitriol, which would looſen and carry off upwards and downwards the viſcous tartarous Recrements impacted in the Coat of the Stomach, which the Water might ſlip over a long while. Specificks judiciouſly choſen, according to the Diſtemper, added to this Water, may aſſiſt in curing ſundry Diſeaſes. But the largeſt Doſe of the Water, ſharpned with Salt of Steel, ſhould be drunk in the Morning, with Exerciſe; and only ſtrong exerciſing Perſons ſhould be indulged an Afternoon-doſe of the Water.

As to the Sulphur-Well, its ſaltiſh Taſte and its much black Salt left upon Diſtillation or Exhalation, ſufficiently prove it to have a ſtrong Body of Marine Salt in it: For this Salt, by ſundry Solutions, Filtrations and Evaporations, becomes the ſame Sea-Salt as we uſe at Table. Bay-ſalt thrice calcined, diſſolved in Water, gives exactly the Odour of the Sulphur-well. Hence he concludes, 1. That Sea ſalt is not a ſimple Salt, but a Mineral Concrete, having an embryonated (*i. e.* the firſt Appearance, beginning, or only volatile, not yet a real or

Drops of Tincture of Galls dropt into the ſame quantity of each, the firſt was a much deeper Purple than the laſt: The firſt was alſo whiter with Spirit of Hartſhorn, than the laſt. I had occaſion to ſee both theſe Waters about an Hour before Thunder and Rain, *Apr.* 6. but could diſcover no Miſt on their ſurface, either in their Baſon, Stream, Veſſels or Glaſſes. They both kill'd Worms; and other ſmall Inſects, by lying in them a few hours. Fifteen Pints of the *Tuewhet-Spaw* exhaled, left twenty ſix Grains of ſediment; thirty two Pints of the *Sweet-Spaw* exhaled, left eighty Grains of ſediment. But in *October*, ten Gallons of the *Tuewhet-Spaw* exhaled, left nine Scruples fifteen Grains of ſediment; ſix Scruples whereof was Earth, and ſeventeen Grains of the firſt Exhalation was Earth alſo. The eighty Grains of ſediment from the Sweet *Spaw* diſſolved and filtred, left two Scruples and four Grains of Earth. A little of the *Lixivium* of the *Tuewhet-Spaw* mix'd with half a Pint of diſtilled Water, with Solution of Silver, was purple, and had a very ſmall ſediment. With Sublimate, it had much woolly ſediment; with Oil of Tartar and Spirit of Hartſhorn, was browniſh, and had a ſmall ſediment; with Syrup of Violets, a faint Green; with Tincture of Logwood, a deep opaque bluiſh Green; with Galls, muddy, and a brown

fixed) Sulphur, cloſe lock'd up in the *Compages* of its Body; whereby the *primum Ens Salium* becomes ſhut up in it, as well as in other Mineral Salts; and therefore cannot be taken away, except the hydropic Moiſture wherewith it abounds, be exhauſted by Flagration or Decrepitation, and the Earthy Feculency, or fetid Sulphur be removed by reiterated Calcination or Fuſion by Fire. For all Mineral Salts are but the ſeveral ſpecificated Concretions of that *primum Ens Salium.* 2. The conſtitutive Principle of ſulphureous Springs, is a *Sal marine,* ſo digeſted in the Bowels of the Earth, as that its Mineral embrionated Sulphur becomes unlooſed, which together diſſolving in the Vein of a Spring, paſſing thro' the various ſtrainers of the Earth. That an embrionated Sulphur predominates in ſulphureous Springs, appears by exhaling the Water: For before half is conſumed, the ſmell is gone. The ſame is the Caſe with the filtred Solution of Bay-Salt. 3. He concludes, that ſuch a Solution of Bay-ſalt, with its embrionated Sulphur in a ſubulous Spring, may be nearer the *primum Ens Salium,* than a coagulated Salt, and is fitter for the *Sal circulatorium.* 4. That Spirits, or the *primum Ens Salium,* before they are coagulated upon Minerals or other Bodies, are but in Embryo, or Infancy; therefore coagulate upon Bodies, to the impairing their own Activity, and ſo require a Reſolution from their Coagulation, by working themſelves up in Textures of Bodies, and ſo require a Reſolution from their Coagulation, before they can be brought to that ſimplicity they were in, when they found Bodies to dwell in. This Sulphur-Well is of little more medicinal Efficacy than ſo much Trencher-Salt, diſſolved in the like quantity of common Water; only the Sulphur doth ſomewhat provoke Nature, ſtimulating the expulſive Faculty of the Stomach, to diſcharge either upward or downward. The Plenty of its Salt preſerves againſt Putrefaction, and Diſeaſes thence proceeding, as, Worms. But its ex-brown ſediment. This Salt ſet to chryſtallize, projected chiefly Chryſtals of Nitre. Three quarts of the Sweet *Spaw* exhaled, left only ſix Grains of ſediment in *October*; which ſcarce changed colour with Syrup of Violets; fermented with Oil of Vitriol, but not with its Spirits; emitted no urinous ſmell, mix'd with *Sal Armoniac*; laid on a hot Iron, it neither ſwell'd, bubbl'd, crackl'd, nor melted. Two quarts of the Allum-Well exhaled, left four Grains of a very dark brown ſediment. Rack-Salt, fermented ſtrongly with Oil of Vitriol, but not with its Spirit, neither crackled, melted, nor boil'd on a red-hot Iron; turned green with Syrup of Violets, but alter'd not Sublimate's Solution, nor was purple with Tincture of Galls; emitted no urinous ſmell with *Sal Armoniac*. Three quarts of *Knaresburgh*-Chalybeate exhal'd, left only ſix Grains of ſediment, very black and ſalt. It fermented with Oil of Vitriol, but not with its Spirit; reviv'd, and made exceeding pungent the dead Spirit of Hartſhorn; crackled, and flew on a red-hot Iron; altered not Solution of Sublimate, nor Tincture of Galls. Thus we find the Sediments of the *Tuewhet*-Spaw and Sweet Spaw are near as 1 to 3072. The Sediments of the Allum-Well and *Knaresburgh*-Chalybeate are near as 1 to 7680. But the Salt is little more than a third of the two firſt Sediments.

138. From

extracted blackiſh Salt hath no more Virtue than common Salt; and tho' there is a Vitrioline Stone 120 Yards diſtant from it, yet partakes it not in the leaſt thereof, either in Taſte or Virtue.

In his Hydropical Eſſays, publiſh'd in 1670, we have a Supplement to the Sweet *Spaw*, from p. 76, to 82; wherein he ſays, he is ſure, whatever others ſay to the contrary, that it hath imbibed but a ſmall quantity from the *Minera* of Iron; firſt, becauſe upon Exhalation, it leaves an inſipid dark-colour'd Earth, arguing, that the Vitrioline Marcaſite the Water waſhes, is lean of Vitriol; therefore it coagulates not Milk like the *German Spaw*. 2. From the great quantity of Water to be drank, before it operates by Stool or Urine. 3. From the Mineral Springs paſſing thro' ſome Vitrioline Marcaſite found in Coal-Ground. 4. Becauſe all theſe languid Vitrioline Waters, on being long expos'd to the Air, or carried, they precipitate a little yellow Sediment, and become effete in their Virtues, and are like common Water, their ſuppoſed Spirit being only imaginary, and a mere *Chimæra*, exiſtent only in the Brains of their Conceivers, &c. Then proceeds to ſome Corollaries on an Experiment on an Infuſion of a Vitrioline Marcaſite ſtriking Purple with Galls.

Dr. *Liſter*, p. 32, *Exercit. prior dictis*, *Medical. Angliæ*, ſays, that *Harrigate* Sweet Spaw has the ſame Lime-ſtone-Salt, but very few Grains in a great many Pounds: For out of eighty Pints of it he produced only ninety Grains of Sediment.

Thus, I have given here a full Extract of all the Pieces that have been publiſht on theſe Waters, both Sulphur and Chalybeate, that I might not mangle and diſfigure them, by retailing them into Parcels on the different Waters: For ſome of them are very ſcarce and rare; therefore ſuch as have them not, have here their whole Subſtance, and need not trouble themſelves for the Treatiſes.

138. From what we have ſaid on theſe Chalybeates, we ſhall briefly draw the following Inferences.

1. Since the *Iuewhet Spaw* weighs ſo much lighter at the Spring-head, ſits eaſier upon the Drinker's Stomach, goes ſooner off the Body, ſparkles more on pouring out into Glaſs, than the ſweet Spaw, we ſay, the firſt is much richer of the Mineral Spirit than the laſt.

2. Since the firſt lies lower, riſes more immediately from its Minerals, affords more Oker, and that of a deeper brown Colour, heavier, more ſtiptic to the Taſte, and the Spring throws out much leſs Water in any given time, and that of a more reſtringent Irony Taſte and Inky Smell, gives a deeper Purple, and affords a larger Precipitation with Galls, by the help of a leſs Precipitator than the other; we ſay, the firſt is richer and ſtronger of the Chalybeate Principle than the laſt.

3. As the firſt is richer of the Mineral Spirit, goes ſooner and more eaſily off the Stomach and Body, and is more quick in its Operation; ſo it's a more penetrative, inciſive, attenuating, and powerful Deobſtruent than the laſt.

4. As it contains much more Oker, and that richer of the Metal, and rougher and harſher to the Taſte, it's therefore a greater Aſtringent and Vulnerary than the laſt.

5. Since this Water, when freſh, cruddles Soap, taſtes rough, harſh and Irony, and is of great medicinal Efficacy; but when it's taken up, and expos'd thirty ſix or forty Hours to the open Air, or carry'd to ſome conſiderable diſtance, it loſes its Taſte and medicinal Virtues, and ceaſes to cruddle Soap: We ſay, theſe were the Effects of ſome Salt, tho' neither the Eſurine, nor the *Acidum vagum*, which we know not what it is, nor what Idea to form of it, having never come under our Senſes nor Examination, but really imaginary.

6. But thoſe Waters, when freſh, ſtriking Purple with Galls, Oak-Leaves, Green Tea, *Sumach*, Red Roſes, *&c.* and bluiſh with Tincture of Logwood, which are the Characters of, and only compatible with Vitriol; we ſay, this Salt is Vitriol only.

7. But ſince, upon long ſtanding, whether expos'd to the Air, or not, or on long Carriage, they loſe both their Taſte, Clearneſs, and tincturing Property, and cruddle Soap no more; we ſay, this Vitriol is wholly Volatile.

8. Since a third of each of a Phial-Glaſs of each of thoſe Waters warmed, ſtruck alike Purple with Galls; but neither ſtruck Purple when the Water came to boil: And ſince the firſt is ſooner effete

by ſtanding or Carriage than the laſt; its plain, the Vitriol of the firſt, as it's more in quantity, ſo it's more volatile than that in the other.

9. Since the proportion of ſediment in theſe Waters is only to the Vehicle, as 1 to 3072, and the proportion of fixt Salt to the Body of Water is ſcarce as 1 to 9000; then we ſay, theſe fixt Parts have a very inconſiderable part, or rather no ſhare in the Cures done by them.

10. But ſince theſe Waters, when kept till they have loſt their volatile parts, load the Stomach, occaſion Flatulencies and Indigeſtion; and go off the Body more ſlowly than common Water, and finally, rather beget, than cure Diſeaſes; we ſay, their whole medicinal Effects lie in their volatile parts, and in them only.

11. Theſe Waters, upon Exhalation, have a ſediment, which we call their *Fixt Parts*; part whereof is diſſolvable in Water, and part not; the firſt we call *Salt*, which is moſtly Nitre; the laſt is Earth, and chiefly Oker.

12. Since the Water lathers with Soap, after it's kept, tho' we find it retains its Nitrous Salt; then, not this Salt, but its Vitriol, was the cauſe of the Soaps crudling before.

13. Since the Allum-Well produces the ſame *Phænomena* with the Chalybeates; and ſince we find it ſtreined through Vitrioline and Sulphureous Concretions, brought up thereby, and generated out of the Water; we ſay, this Well is alſo Vitrioline, and the contrary is an Error.

14. Since theſe Concretions have been diſſolved in, and mixed with Water, before it came to the Day, and that they contain as much if not more Sulphur than Vitriol, as is evident from the vaſt quantity of yellow Brimſtone they afford on keeping, and from their Flame in the Fire, and Smell when freſh; we ſay, theſe Chalybeate-Springs are impregnated with Sulphur, as well as Vitriol; both which are the Product of the Iron-ſtone, or Marcaſites.

15. Since the upper part of the warmed Water in the Phial ſtruck Purple with Galls, *&c.* but not its middle, or lower part, we ſee, the Spirit riſes firſt from the bottom, and aſcends to the ſurface of the Water, by Heat or ſtanding, before it leaves its hold wholly; and therefore, after long keeping, only the upper part of botled Chalybeate Waters is medicinal, the reſt being no more, and ſcarce ſo good, as common Water.

16. Since the Phial-Glaſs inverted in the Pan of Water till it boiled, then taken out, and poured on Tincture of Galls, tinctured

not, we ſee it's a vain and idle Attempt, to ſeek to procure a *Spirit* from Mineral Waters by Diſtillation, as ſome at *Scarburgh* laſt Summer imagin'd they could; but upon Trial, found themſelves diſappointed, for all their Cunning, as I had told them before.

17. Since the inverted Phials of Waters, warm'd equally, ſtruck a ſmall Purple, then this ſeems the beſt way to warm or preſerve Mineral Waters, to make the whole Bottle equally medicinal, or to preſerve a Mixture of the Volatile Vitriol, that may be equally mix'd with the whole.

18. Since the Water in the Pan tinctur'd not at all when hot, but that in the cloſe-cork'd Phial, tho' of the ſame degree of Heat, ſtruck a Purple; then this ſhews us, that this is the beſt way of warming thoſe Waters to preſerve their Virtue, and prevent the Loſs of their whole volatile Parts: And ſince the ſame Phial cork'd again, and put into the Pan of Water, ſtruck not purple a ſecond time, then no more than one Draught ſhould be warmed at once: And ſince there was a purple ſhade in theſe Waters when immediately pour'd out on Tincture of Galls, which inſtantly faded; then theſe warm'd Waters are to be drunk the moment they are poured out.

19. Since theſe Waters have their ſpecifick Gravity encreaſed doubly their former Gravity, upon a little time ſtanding, and have loſt their briſk, ſprightly, ſparkling, bubbling Property; but yet continue to ſtrike a Tincture with Galls, &c. then it's plain, their Mineral Spirit, and Tincturing Property are two different Principles.

20. Since this Water coagulates not Milk, even upon warming and boiling with it; then is a Milk-Diet allowable and uſeful in various Caſes, with a Courſe of Chalybeate Waters.

139. 21. Since a Glaſs-Body cannot prevent the Exhalation of either the Mineral Spirit, or Volatile Vitriol of thoſe Waters, either on warming or ſtanding; neither can the Pores of our Bodies and Veſſels, which are much larger, and loſe ſo much every day by Perſpiration; eſpecially ſeeing the Fluids are in continual Motion; and ſince the Waters become ſoon effete, and when ſuch, do load and pall the Body and Veſſels; then it's certainly very fooliſh to drink the Waters, when they have neither a proportionable Vent backward nor forward. Such do, by their own ſtupidity, not the Waters fault, expoſe themſelves to many dangers. 2. Since by daily Experience, we are convinced of the neceſſity of Exerciſe, for promoting Digeſtion, Circulation, Nutrition, Secretion and Evacuation, even in a

healthy ſtate. And ſince the moſt healing and efficacious Principles of thoſe Waters are ſo very ſeparable and volatile, and the Veſſels ſo very improper to retain them long; then muſt we take care to uſe Exerciſe along with them; firſt, as it's ſo proper an Aſſiſtant to the Waters; then, that the common Vehicle may be carried off, together with the more ſeparable parts, that the laſt being gone, the other may not continue a ſluggiſh, heavy, palling Load in the Body. 3. Since we are convinced, that by violent Motion, the Blood's Motion and Momentum are encreas'd, its Conſiſtence thinn'd and rareſy'd, its Globules too much divided, and thrown into the Orifices of the ſmaller lymphatic Arteries, the ſubtiler parts attenuated and expell'd; then muſt we not uſe too violent Exerciſe, leſt we throw the groſſer and unprepared parts of the Blood, now thinned, into the ſmaller Veſſels, and promote too early an Expulſion of its neceſſary finer diluting Parts, and ſo clinch thoſe Obſtructions we came to get cured. 4. But ſince Exerciſe muſt be uſed, in order to attain the great and valuable Ends, it neceſſarily follows, that the expected or deſired Secretions and Diſcharges muſt be made, when the ſecretory Veſſels are emptieſt, moſt patent and paſſable, which is in the Morning, the preceding Night's Reſt having relaxed and expanded all the Veſſels of the Body, dilated their Pores, and encreaſed the Blood's circulating Force; all which contribute to the Commixture of the ſundry parts of the Blood, its Attenuation, throwing off ſuperfluous Parts, and unloading the excretory Ducts on the Body's ſurface. Therefore the Blood's quantity being leaſt, its Parts beſt mixed, freeſt from ſuperfluous Redundancies, and fitteſt for free and eaſy Circulation, the Veſſels cleareſt, moſt invigorated and elaſtic in a Morning, the Commixture of the Water with the Blood, and its Secretion therefrom again, by the help of Exerciſe, muſt be moſt expeditely performed in a Morning. 5. Since a healthy Secretion depends ſo much upon a thorough Digeſtion, Mixture, and due Diminution of the Parts of the Blood, Patency of the Veſſels, ſecretory and excretory Ducts, it's unſeaſonable and raſh, to drink a large quantity of thoſe Waters, after a full Meal, eſpecially when the crude Chyle is yet mixed with the Blood in the larger Veſſels, unattenuated and unprepared for paſſing the ſecretory Tubes; and yet by throwing in much Water, encreaſing the Blood's quantity, dilating and weakening the Veſſels, the Chyle muſt be carried there; but its Parts being too groſs and tenacious, will very likely ſtop in ſome of the Orifices of the excretory Ducts, the Diameters of its Parts being too large to paſs the Veſſels. Hence new Obſtructions, inſtead of removing the old. But the caſe will yet be more dangerous, ſhould we uſe immoderate Exerciſe after a full Meal. 6. Seeing healthy Secretions and Evacuations depend ſo much on the Commixture, Digeſtion, and Diminution of the ſuperfluous parts of the Blood, let us mind how we indiſcreetly indulge our Appetite with Meat of heavy or hard Digeſtion, too ſolid, durable, or tenacious Parts; or with Variety of Diſhes, which require a greater force to complete the firſt, ſecond and third Digeſtions in due ſpace, or with a leſs given force, eſpecially at Night, all the Solids being laid by in a relax'd paſſive ſtate, except thoſe of involuntary Motion. 7. Is Reſt ſo neceſſary, for Digeſtion, and Commixture of the parts of the Blood, Secretion and Appoſition of its nutritive, Evacuation of its ſuperfluous Parts, Diminution of its Quantity, and the Cleanſing and Invigoration of the Veſſels? Then, by all means, ſuch as have occaſion for, and expect Relief from Mineral Waters, muſt take care, that during this Courſe eſpecially, they invert not the courſe of Nature, in turning Night into Day, and Day into Night.

140. Next come we to *Quanrdun*, *Guile-Thwait* or *Gillfoot*, *Fullwood*, and *Broomleſs-Moor*. The firſt of theſe lies two Miles from *Derby*; when, or by whom diſcover'd, I cannot learn. However, it has been of great eſteem, and reckoned by ſome, a Specific in Coughs, Aſthma, Conſumption, Spitting of Blood, Hyppo, Cachexy, *Chloroſis*, deficient, obſtructed, ſuperfluous and irregular *Menſes*, Indigeſtion, &c. The Spring neither increaſes nor decreaſes by Drought, Rain or Seaſons: But before Rain or boiſterous Winds, it turns white; which Colour is deeper or lighter, according to the quantity of Rain to fall, or Tempeſt of Wind. It never freezes in the greateſt Froſt. It makes a very fine Lather; mixes and boils well with Milk. It riſes up towards the South, out of a Rock, like rotten Iron-ſtone: Its ſurface is level with the Earth. This Water, and *Kedleſton*, mixed freſh, are firſt clear, inſtantly a Violet-Purple, then a blackiſh Colour. This Water put up in Bottles, wherein *Kedleſton*-Water had been, turns purple; and this is peculiar to *Kedleſton*, of all the Sulphur-Waters I have met with, to turn Chalybeates purple. The Oker of this Water is ſmall in quantity, of a light brown Colour. On the top of *Quarndun*-Hill, a quarter of a Mile from the Spaw, they ſunk for Coals, and found very good in great Plenty; but the Work, thro' ſome deſign, was ſtopt. Iron-ſtone gives this

Water both its Principles and Virtues. It has alſo a little Nitre from the Earth about it. The Water kept in a Pint-Bottle two Nights, and carried a few Miles, ſtruck the ſame Colours with Logwood, Galls, *Sumach*, Green Tea, and *Braſil*-Wood, as at the Spring. Two Gallons of it left half a Dram of a light colour'd Sediment, above half whereof was Nitrous Earth; tho' the Authors of the *Magna Britannia*, according to their blundering cuſtom, tell us, it's as rich of the Mineral, and brisk in Operation, as the *Yorkſhire* Spaws. I ſuppoſe, they mean *Scarburgh*; whereas there we have not a Grain of fixt Salt to a Pint of the Water, which can enable it to operate no more than the Preſſure and Bulk of the Vehicle.

141. *Guilethwait*, or *Gillfoot*-Spaw was firſt diſcover'd in 1664, by Mr. *George Weſtby* of *Guilethwait*, who had ſtudied Phyſick. He ſoon built a ſmall Houſe over the drinking Well, and made below it a large Receptacle or Bath, for ſeveral People to go in at once. He, and Dr. *Tarburgh* of *Newark* on *Trent* were great Favourers and Promoters of it while they liv'd, gave all Encouragement, and provided all neceſſary Conveniencies for Strangers that reſorted to it: Nor was the Water behind-hand with them, in producing very great and ſurpriſing Cures. But after their Death, the Farm wherein it lies, belonging to the Duke of *Norfolk*, fell into other hands, who uſed Strangers ſo roughly, that the Place, in a few Years, was deſerted by all its Gueſts. The Spaw riſes out of the North ſide of *Bole*-Hill, where is a Delve of Greet-ſtone for Grindle-ſtones; but near the Spaw is Iron-ſtone. It leaves very much Oker in its courſe, of a deep reddiſh brown Colour. Its Surface is cover'd with a thick blue Scum; its Mud is very full of Sulphur. The Colour of the Water is clear, but becomes whitiſh by ſtanding; its Taſte very ferruginous, and Smell Inky. It crudles Soap, and boils with Milk well. Five Gallons of it exhal'd, left ſix Scruples and a half of Sediment, three whereof was a dark browniſh Oker, and three Scruples, Salt, which diſſolv'd in diſtill'd Water, it ſuddenly crudled Solution of Silver. The whole Liquor was a deep Purple. With Oil of Tartar and Spirit of Hartſhorn, the Liquor was clear, and a large white Sediment. With Tinctures of Logwood and Rhubarb, a deep reddiſh Brown; with Tincture of Galls, a deep Oak-Leaf Green, and much Sediment. The fixt Salt from other five Gallons of it, ſeparated from its Earth, and ſet to cryſtallize, afforded moſtly Nitre, with a few ſmall Cryſtals of Marine Salt. This Water has done very great Cures in Vomitings, Belchings, Flatulencies, Hyppo's,

Indigeſtion, Cachexy, Cacochymy, Gravel, Sand and Stone, obſtructed *Catamenia*, Green-ſickneſs, Heat and ſtoppage of Water, bilious and habitual Cholicks, Acidity and Acrimony of the Humours of the Body, Heart-burn, nidrous Belchings, habitual Thirſt, &c. The Clay in its Stream taken up, dried, kept in a Box, and moiſten'd, made into a Paſte with common Water, has been found very effectual in ſoftening Corns, and making them fall off without pain or trouble. The late Duke of *Leeds* was never without it, for this purpoſe, either in Town or Country. It's alſo ſovereign, in curing old Sores, Ulcers and Swellings. Dr. *Joſeph Brown* has given an Account of ſome of its Cures [d].

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[d] *An Account of the wonderful Cures performed by Cold Bathing*, 2d Edit. 1707, 12°. p. 144.

P. 16, 17, 18. A ſurpriſing Cure was performed by the Oker of *Guilthwait*-Spaw near *Rotheram*, on a certain poor Man, aged above 40; who having a ſcald Head from his Infancy, he mixed this Oker with Clay, made it like a Cap, applied to his Head, which he alſo waſh'd daily in the Spring, and was perfectly cured, got a freſh Head of grey Hairs as white as a Child's, tho' quite bald before, and never had a Hair on his Head in his Life. *One* Will. Mercer, *a Day-tale Man to Mr.* Weſtby, *aged near 60 Years, had always a thin Head of Hair, but by a Fever became intirely bald; by the ſame means had a ſtrong thick Head of Hair reſtored.* One *Weſton*, a Shoe-maker in *Weſtgate Rotheram*, had a Cancer in his Breaſt, which had ſpread it ſelf all over the intercoſtal Muſcles, eaten them, and laid the Ribs bare to ſight; after he had in vain tried all other Advice and Medicines he could procure, he waſhed daily in the Water, and applied the Clay and Oker in the Stream; and beyond, and contrary to all human expectation, he got perfectly cured in one Summer-ſeaſon, was healthy and free from this Diſtemper to his death.

The Clay, (*p.* 57.) of Chalybeate Waters cleanſes, mollifies and diſcuſſes all kind of ſwellings, heals old running Ulcers, and the moſt virulent corroding Cancers. Many from *Sheffield*, become Paralytic by Mineral Fumes, come yearly to *Guilthwait Spaw*, bathe, and are relieved by it. *Simon Shore*, an Apprentice-Boy in *Sheffield*, to a Button-maker, got ſuch a weakneſs in his Limbs, that he quite loſt the uſe of his Legs. He bathed here twice a day during the whole Summer-ſeaſon, grew ſo ſtrong, that he could walk both times a day from *Rotheram* hither, which is two Miles. He recovered his Health and Limbs, only eſcap'd with diſtorted Knees. And it has reſtor'd ſeveral, whoſe Knees knock'd together as they walk'd. And ſeveral that came with Crutches, have left them, and returned home cured. And ſuch Labourers as have been numm'd, and loſt their Limbs by lying out in the Night-Dews, have preſently fled hither for Relief, and found it. He has ſeen deplorable Lameneſs and Weakneſs through all the Joints often and happily cured by it in a ſhort ſeaſon; as alſo Rheumatic Pains in all the Joints, with continual Heavineſs and Oppreſſion at the Stomach, Fainting Fits, and ſwellings in the Limbs, perfectly removed thereby. And alſo Scab and Leproſy are effectually remedied thereby, &c.

142. *Fullwood-Spaw*, or *Eaton-Spaw*; the firſt Name it has from the next Village, about a Mile off; the laſt, from its Benefactor, the late Mr. *Tho. Heaton* of *Sheffield*; who laid a Baſon, built a Houſe over it, and made a Way to it, from his great Philanthropy. It lies about four Miles South-Weſt of *Sheffield*, riſes up on the North ſide of a moſt deſert, heathy, moſſy Mountain, is intenſly cold, beyond any other Chalybeate Water yet met with; and at the ſame time it's forty Grains lighter than common Water, at the Spring, and twelve Grains in a Pint only lighter, when it has ſtood an Hour or two; that is, it's twenty eight Grains lighter when juſt taken up, than it is two hours after. It was of very great Note formerly, much frequented, and vaſt benefit reaped from its uſe, in all Caſes wherein light Chalybeates take place. I have been told, that there was once a Treatiſe wrote upon it; but after my ſtricteſt Enquiry, I cannot learn when, or by whom. It ſits exceeding light on the Stomach, goes quickly off, is a powerful Diuretic, forcing its way through Obſtructions, raiſes the Spirits, takes off gloomy, penſive, melancholy Clouds and Damps, ſets all Irregularities of the *Menſes* at rights, breaks through removable Barricades in the Liver, Spleen, or other *Viſcera*, reſtores a loſt Appetite and Digeſtion, clears the Stomach, Kidnies, Inteſtines, Ureters and Bladder; helps Stuffings and ſhortneſs of Breath; depoſits and converts the pent Moſs in its ſtream into Oker, whereof there is the moſt monſtrous quantity here I ever met with in one place. At the ſide of the Baſon might be made an excellent and firſt-rate Cold Bath in all the Neighbourhood. It conſtantly throws a ſmall white Film, like Goldbeaters Bladder. A Phial filled a third part full of its Water, cork'd cloſe, and ſet in a Pan of Water, and put over the Fire, when the Water was ſcalding-hot, the Bottle threw forth its Cork, with a Crack like that of a Piſtol. But when the Water boiled, it ſtruck no longer Purple with Galls. Whilſt I was weighing the Water, the hydroſtatic Ballance fell into the Well, and muddied it. However, twenty eight Pints of it taken up in this condition, and exhal'd, left only nineteen Grains of Sediment, eight whereof were Earth; ſo that the Sediment of this *Spaw* is to its Vehicle, ſcarce as 1 to 10752. Theſe thirteen Grains of Salt diſſolved in diſtilled Water, it precipitated the Silver, and left the Liquor perfectly clear. It turned Tincture of Rhubarb of a dark blackiſh Yellow; with Solution of Sublimate, of Sugar of Lead, Oil of Tartar and Spirit of Hartſhorn, it remained perfectly clear, after two Days

ſtanding; with Syrup of Cloves, a dark blackiſh Green; with Syrup of Violets, a muddy Clear; with Tincture of Logwood, an opaque Blue, or deep Black, till much diluted, and then a fine tranſparent Blue; with Tincture of Galls, *Sumack*, and Green Tea, a beautiful Purple. So that we ſay, tho' there neither is, nor has been any Coal-pits or Iron-works, or other Sloughs or Levels here, it contains a little Earth, a volatile and fix'd Vitriol, with a ſmall pittance of marine Salt.

This *Fullwood* joyns to *Riveline*-Moor, which formerly (when the Lords *Lovetofs*, *Furnival*, *Shrewsbury*, &c. had their Reſidence at *Sheffield*-Caſtle) together with *Loxley*, *Stanington*, &c. made a fine Chaſe of about ſixteen Miles Circumference. *Thomas de Furnival* got a Charter for a Weekly Market at his Manor of *Sheffield*, in 1295, and two Fairs yearly; which Town has flouriſh'd ever ſince, and is now computed to contain near 20000 People, tho' an Hiſtorian tells us, in 1731, that it's a ſmall Market-Town.

143. *Broomleſs-Moor-Spaw*, near five Miles from *Bradforth*, lies in the middle of a rotten Peat-Moſs; but has an excellent little Baſon made for it, and a Drain cut to carry off all the Water and Sludge, by that worthy Gentleman *Richardſon Farrand*, Eſq; Proprietor of the Grounds. The Water is very clear, ſtrong of the Chalybeate, and a notable Diuretic and Opener of Obſtructions; is always covered with a thick blue Scum, and leaves much Oker in its Stream. Three Pints and an half of it exhal'd, left only twelve Grains of Sediment, five whereof were Salt; which cryſtalliz'd into ſmall Cryſtals of Nitre. This is the ſtrongeſt, pureſt, lighteſt Chalybeate in thoſe Bounds; tho' they have many, yea, almoſt endleſs in number, and many of them proceeding from Coal. The proportion of Sediment is to the Water, as 1 to 2240.

With

With	*Quarndun*,	*Guile-Thwaite.*
Solution of Silver,	a bluiſh Purple.	bluiſh White, and a ſedt.
— of Sublimate,	white, and crudled.	white.
— of Sugar of Lead,	white, with a dusky ſediment.	white then great ſediment.
Oil of Tartar,	dusk White.	a yellowiſh ſediment.
Spirit *C.C.*	whitiſh.	clear, and a little ſediment.
Acid Spirits,	bluiſh Clear.	clear and full of Bubles.
Syrup of Violets,	a light Blue.	bluiſh Green.
— of Cloves,	a fine dark Violet.	blackiſh and a purple Caſt.
Tincture of *Braſil*,	a light Red.	a deep Red.
— of Logwood,	beautiful deep Blue.	deep Mazarine Blue.
— of Galls,	a ſhining Purple.	a deep purple Red.
— of Green Tea,	deep crimſon Purple.	Purple, then opaque.
— of Red Roſes,	blackiſh Purple.	dark dirty Purple.
French Brandy,	blackiſh Purple.	firſt dark, then a charming Purple.

With

With	*Fullwood,*	*Broomſmoor.*
Solution of Silver,	bluiſh White.	pale Blue.
— of Sublimate,	clear.	faint Orange & crudl'd
— of Sugar of Lead,	clear.	white clear, ſmall ſed^{t}.
Oil of Tartar,	ſlight yellow Clear.	yell$^{\text{ſh}}$.crud.& yell.Cl^{ds}.
Spirit *C. C.*	pale Yellow.	pale Yellow.
Acid Spirits,	clear and full of Bubles.	clear and full of Bubles.
Syrup of Violets,	greeniſh Blue.	yellowiſh Green.
— of Cloves,	dark fine Blue.	
Tincture of *Braſil,*	purpliſh Red.	fine deep Red.
— of Logwood,	very fine deep Blue.	very deep purpliſhBlu.
— of Galls,	Mazarine Purple.	very pleaſant Purple.
— of Green Tea,	purple.	blackiſh Purple.
— of Red Roſes,	bluiſh Purple.	deep greeniſh Blue.
French Brandy,	blackiſh Colour.	blackiſh.

244. *Aſhover*

245. *Aſhover-Spaw*, four Miles from *Cheſterfield*, and four from *Matlock*, riſes Southward, at the foot of a ſmall Hill, called *Twitch-bank:* It empties it ſelf into *Marſh brook*, about ten Yards below, lines its Courſe with much yellow Oker; its Stream is very weak and ſmall by Day, but much ſtronger all Night. The Rains and Drought neither affect nor alter its Quantity; yet in Winter it throws out the ſame Quantity Day and Night. It riſes out of a Bed of Shale two or three Yards thick, and about half a Mile long, till it is cut off by a Bed of Lime-ſtone, between which lies the Ore (This is peculiar to this place) Much Iron ſtone is mixed with this Shale. This Water is a dark pale Purple with Tincture of *Braſil*-Wood; firſt a deep Blue, then an opaque bluiſh Black with Tincture of Logwood; firſt a red purple, then almoſt Ink-black with Tincture of Galls. It was firſt pearl, then purple with Solution of Silver. With Solution of Sublimate it was whitiſh, with a variegated Pellicle; green with Syrup of Violets. Seven Pints and a half of it exhal'd, left 27 Grains of ſediment; the Salt whereof diſſolv'd in diſtill'd Water, when the following Mixtures had ſtood four Nights, it turned Solution of Silver purple. With Oil of Tartar, it was firſt white, then let fall a ſediment like white Sand. It was white with Spirit of Hartſhorn, clear with Syrup of Violets, blackiſh clear with Syrup of Cloves, a Sack colour with Tincture of Logwood, clear with Tincture of Galls. Hence it contains only a volatile Vitriol, a little Nitre, and ſome Oker. Its ſediment is to its Vehicle as 1 to 2133^{2}.

245. We have alſo another Chalybeate on *Burleigh*-Moor, near *Sheffield*; and one at *Beighton*, a Mile and half Eaſt of it. The firſt abounds with volatile Vitriol; eight Pints and half of it exhaled, left 39 Grains of whitiſh colour'd ſediment, the Salt whereof precipitated Silver, and gave a ſmall ſediment, with Oil of Tartar and Spirit of Hartſhorn; but was very clear with Tincture of Galls. Therefore it has no fixt Vitriol, but marine Salt, with a little Nitre. Its ſediment is to its Vehicle, near as 1 to 2176.

Beighton-Spaw is a Light Chalybeate, is very drying, healing, diuretic, and ſtomachic; it contains only a little Oker, and ſome marine Salt, no fixt Vitriol. Both theſe boil with Milk, and make a good Lather with Soap. We have alſo one at *Darnal*, two Miles from *Sheffield*; a wretched heavy one, in the Pond-Lane in *Sheffield*, the product of Coal. Mr. *Craſhaw*'s *Chalybeate*, which is very clear and pure, but weak. All the Water that ſupplies the High

Houſe, the Seat of *George Bamfort*, Eſq. is a *ſmall Chalybeate*. Another at *Bithams* in *Bradfield*-Pariſh; ſeveral in *Ecclesfield*-Pariſh; one at *Cranmore*; one at *Ulley*; another on *Whiſton*-Common; one below *Rawmarſh*; *St. Peter's-Well* near *Doncaſter*; one at *Ranfield*; one at *Darfield*; one between *Barnſley* and *Uper*: But indeed, there is no end of reckoning them; *Yorkſhire* alone ſupplying us with at leaſt ten thouſand ſuch.

146. The Chalybeate near *Matlock-Bridge* is weak of the Mineral Spirit, much Volatile Vitriol, has but a nauſeous taſte, nor goes it quick off the Stomach. One Drop of Tincture of Logwood to a Glaſs of it makes a fine Blue. With two Drops of Tincture of Galls it's a deep Crimſon; with Green Tea it's a blackiſh Purple. It contains no fixt Vitriol, but a little Nitre. Seven Pints of it exhal'd left half a ſcruple of ſediment: ſo that the Sediment is to the Water as 1 to 5376. There is alſo a ſtrong Chalybeate in *Wirkſworth*, which, if it had a ſmall Baſon, that it might clear it ſelf, would do good ſervice; but at preſent the Receptacle is too large. Hence the Water loſes its Mineral Spirit, is muddy, and unpleaſant to the ſight. It gives all the ſame *Phænomena* as *Matlock*-Chalybeate; five Pints of it exhaled left a Dram of ſediment, 36 Grains whereof was Earth, the other twenty four were Nitre and Marine Salt, upon Cryſtalization. The Sediment here is to the Water, as 1 to 640. There is alſo a finer Chalybeate at the South End of the Town, in a Marſhy Meadow, called the *Fiſh-Pool Flat*, at the foot of a fine Hill. Its Stream is damm'd up with a very reddiſh brown Oker, the Water cover'd with a Scum, and a thick ſtrong Lather like Soap. Galls alter'd it not in the leaſt for ſeven minutes, and the Tincture of Galls ſtruck it in two hours a bluiſh Purple; Tincture of Logwood, a fine deep Blue; Tincture of *Braſil*, a ſmall Purple; Green Tea, a blackiſh Purple; the acid Spirits ſmoak'd with it, and fermented. A Quart of it exhaled, left three Grains of black ſediment; which is to the Water, as 1 to 5120. It's a fine colour, ſparkles and bubbles when pour'd out; has no Inky ſmell, nor nauſeous taſte; but has a moſt delicious, Nitrous, pungent Flavour, like *Pyrmont*-Waters. It riſes out of Earth-ſhale and Greet-ſtone. This I call *ſui Generis*, having found none like it in *England*. Its Salt makes Solution of Silver a little whitiſh, is clear with Tincture of Galls: Wherefore it contains only a noble Volatile, but no fixt Vitriol; is rich of Mineral Spirit, and has a light volatile Nitre.

At *Dofield*-Bridge in the Long Cloſe, is a Chalybeate, which riſes up at the foot of a Deſcent, a Mile North of *Quarndun*, about 12 or 14 perpendicular Yards lower. It is neither ſo light on the Stomach, nor ſo pleaſant as *Quarndun*. Five Pints of it exhal'd, left ten Grains of ſediment; which is to the Water, as 1 to 430 There is alſo another Chalybeate in the *Backmores* Cloſe at *Dofield*: It lies in a flat boggy Ground, overgrown with Ruſhes. They have a third in the middle of the Town, which burſt up about thirty Years ago, in boring for Coal, is wall'd about, and pav'd, call'd *Dofield Spaw*. It riſes the thickneſs of the Bore, from a ſubterranean Current fifteen Yards deep. They have a Fourth, called the *Paper-Mill-Spaw*, riſes in a flat Ground, therefore overflow'd with Floods. It abounds with Sludge and Oker, and is cover'd with a thick variegated Scum. All theſe lather with Soap, and boil with Milk, but a little heavy upon the Stomach. At *Eagleſter*, *Rouſely-Bridge*, *Burgh*, *Hope*, *Caſtleton*, *Cheſterfield*, *Whittington*, *Beauchief-Abby*, *Woodſeals*, &c. are more of thoſe *Spaws*. They moſtly riſe out off Shale, with Iron ſtone or Marcaſites of Iron, except *Cheſterfield*, *Dofield*, *Whittington*, *Beauchief-Abbay*, which ſpring from Coal chiefly, and a little Mixture of Iron-ſtone: For to one that is accuſtom'd to them, it is eaſy to diſcover when they come from Coal, and when from Iron ſtone, moſtly. Six Pints of *Caſtleton-Spaw* left ten Grains of ſediment; three Pints of *Burgh-Spaw* left ſix Grains of ſediment.

147. The following are chiefly the Product of Iron-ſtone, *viz.* *Burleigh*-Park-*Spaw* by *Stamford*, juſt by the Right Honourable the Earl of *Exeter*'s Houſe. It weighs fifty Grains in a Pint lighter than common Water, at the Spring, but gained thirty four Grains, by carrying it to *Stamford*, and ſtanding an Hour in a Pint-Mug. It is green with Tincture of Nephritic Wood, and lets fall a yellow Precipitation; blackiſh Brown with Tincture of Rhubarb, and lets fall an Orange-Precipitation; with Solution of Sublimate, clear, and has a ſmall light colour'd ſediment, with Solution of Sugar of Lead; clear, with a very little ſediment, with Oil of Tartar; clear, and a yellowiſh ſediment, with Spirit of Hartſhorn; a tranſparent deep Green, with Syrup of Cloves; green, and crudled, with Syrup of Violets; clear, and a large blue ſediment, with Tincture of Logwood; deep opaque purple Liquor, clear, and much deep purple ſediment, with Tincture of Galls. Five Pints of this Water exhal'd left fourteen Grains of ſediment, nine whereof was Salt marine and Nitre mixt; the Earth was Oker. This Water is exceeding light, ſtrong of the Chalybeate, rich of the Mineral Spirit, if drunk at

the Spring, has few fixt Parts, and very little Earth. About a Mile and half from this, is *Wittering Spaw*; it's as clear as Rock-water, has a harſh Chalybeate Taſte; there is a little Oker in its Stream and Baſon; it weighs ſixteen Grains in a Pint lighter than common Water, at the Spring; but gain'd four Grains at the Town. It is a dark Pearl, with Solution of Sublimate; has a ſmall brown ſediment, with Solution of Sugar of Lead; pale, muddy, with Tincture of Nephritic Wood; lets fall a yellow ſediment, with Oil of Tartar; was a deep Green, with Syrup of Cloves; a bluiſh Green, with Syrup of Violets; bluiſh Clear, and a little crudled, with Tincture of Logwood; deep bluiſh Green, and a ſmall purple ſediment, with Tincture of Galls. Twelve Pints of it exhal'd, left almoſt four ſcruples of ſediment, very black. Half a Pint of each of thoſe Waters let ſtand all Night in uncork'd Quart Bottles, next Morning they gave not the leaſt Tincture with Galls, or *Sumach*, or Green Tea. The Genus of the ſediment of this Water is the ſame with the laſt, only it contains leſs of the Minerals, volatile and fixt. Its Salt diſſolved in diſtill'd Water precipitates Solution of Silver; gave a ſmall ſediment with Oil of Tartar; with Tincture of Galls, a blackiſh ſediment; with Tincture of *Sumach*, a black ſediment: ſo that here is a ſmall Track of fixt Vitriol in *Wittering*.

Two Miles from *Stamford*, is *Tolthorp Spaw*, whoſe Water is very clear and pleaſant, weighs little lighter than common Water; ſtrikes a deep Cherry-colour, with Tincture of Galls; perfectly clear, with Tincture of Logwood; and a light Yellow, with Tincture of Rhubarb. Hence, it is only a weak Chalybeate, ſlightly impregnated with Minerals, tho' the oldeſt *Spaw* in this Country, and formerly of conſiderable Note, as a Drier of Rheums, Sores, *&c.* *Grantham-Spaw*, without *Spittle Gate*, riſes out of a hot ſandy Ground, under which is a fine Gravel. It ſprings up in a ſmall Deſcent, beyond the *Mitre*, is a very ſtrong large Spring, weighs two ſcruples in a Pint lighter than common Water; briſk of the Chalybeate: When the Mixture of this had ſtood all Night (as thoſe of *Wittering* and *Burleigh* had done) that with Solution of Silver was clear, and a little whitiſh; that with Tincture of Logwood, very green, and a ſmall ſediment; with Tincture of Rhubarb, a deep Yellow; that with Solution of Sublimate, whitiſh, without ſediment; that with Solution of Sugar of Lead, whitiſh, crudled, and let fall a white Pouder; with Oil of Tartar, white, crudled, and let fall a white ſmall ſediment; with Spirit of Hartſhorn, firſt whitiſh, then let ſall a greyiſh Incruſtation, but no ſediment; with Syrup of Cloves, a dark Green; with Syrup of Violets, greeniſh; with Tincture of Logwood, firſt clear, then a bluiſh Black; with Tincture of Galls, firſt a light Cherry, then let fall a ſmall ſediment; Liquor above a fine tranſparent Azure colour. A Gallon of the Water exhaled, left a Dram of ſediment, thirty ſix Grains whereof was a light whitiſh colour'd Earth, the other twenty four Grains were Nitre only. This is a beautiful light Chalybeate for drinking, and would make a ſpecial good cold Bath for Pains, Weakneſs and Lameneſs.

Diderſly Grange Spaw, on *Gatterſly Moor*, near the Rt. Honourable the Lord *Darcy*'s, by *Richmond*, *Yorkſhire*, in the Pariſh of *Melſenby*, is a weak Spring, runs full South, a very clear Water, with a thick blue Scum upon it, taſtes ſtrong of Iron, and ſmells of Ink. It lies in the bottom of a Common in a Boggy Moor, two Miles from *Melſonby*. Several Attempts have been made to find Coal there, but in vain. It lines its Baſon and Stream with Oker; it is very light upon the Stomach, is a powerful Diuretic and Alterative, has been known time out of mind. It is whitiſh with Solution of Sublimate; a fine Pearl, with Sugar of Lead; light Yellow, with Spirit of Hartſhorn; light Purple, with Syrup of Cloves; a Leaden Colour, with Syrup of Violets; light Crimſon, with Tincture of *Braſil*; bluiſh Black, with Tincture of Logwood; a beautiful Purple, with Galls, Green Tea and *Sumach*. Fifteen Quarts of it exhal'd, left 22 Grains of ſediment, ſixteen Grains whereof were Earth, and eight Salt; which diſſolved in diſtill'd Water, crudled, and precipitated in a Yellow Pouder, with Oil of Tartar. Tincture of Galls changed it not; but the two mixt, were firſt deep brown, then Ink-black; laſtly, crudled, and let fall a black ſediment; the Water above was green.

At *Whitby* is another of the ſame ſort. It riſes up at the bottom of a high Cliff of Clay, within the Sea-mark, in the Road-ſide from the Town to the Allum-Works. It bubbles up through the Sand, was formerly Wall'd up, had a Houſe, and ſeveral Conveniencies for Drinkers, being found a great Diuretic, Anti-icteric, and Emenagogic, purged ſome, but moſt, not at all: But now the Sea has waſh'd down all, and fill'd the Place with Stones. It is only to be diſcover'd from its glaring Scum and Oker. Three Pints of it exhal'd, left twenty Grains of black ſediment, which affords chiefly a little Marine Salt, and ſome Nitre.

There is another of theſe at *High Cropton* ; four Pints whereof exhaled, left five Grains of ſediment, browniſh, which fermented ſtrongly with Oil and Spirit of Vitriol ; was green, with Syrup of Violets ; ſent forth no urinous ſmell, with *Sal Armeniac*, neither bubbled, melted nor crackl'd on a red-hot Iron ; muddy and green, with Galls : Therefore only Oker and a little Nitre.

Another at *Loskelm*, near *Pickering*, which riſes up in a Boggy Place, at the foot of a Hill. Its Baſon and Stream are full of Oker, and it has a ſtrong ferruginous Taſte. Its fixt Parts are Oker, and a very little Nitre.

Another good light Diuretic Chalybeat at *Black Park* in the Pariſh of *Middleton* ; lies in a Boggy Place, cover'd with Oker and Scum. Two Quarts of it exhal'd, left ſeven Grains of ſediment.

Middleton-Spaw, near *Pickering* ; two Quarts of it exhal'd, left 50 Grains of ſediment, twenty whereof were Salt ; which diſſolved in diſtill'd Water, turned purple, with Solution of Silver ; precipitated, with Oil of Tartar and Spirit of Hartſhorn ; was an opaque Blue, with Tincture of Logwood ; a deep Red, with Tincture of Galls. Wherefore we ſay, this Salt conſiſts of Nitre and fixt Vitriol.

Another at *Beverly*, about a Mile Eaſt of the Town, in the middle of a Bogg. It's a very diuretic, drying, cleanſing, healing Water, being drunk and bathed in ; and from its Sulphur, Clay and Oker, has done conſiderable Cures in ſcrophulous Caſes, and other Ulcers, Scab, Itch and Lameneſs, Rickets and Pains. The laſt it has not from its Minerals, but in common with the cold Bath. It is full of Oker, and covered with a Scum, has much Spirit and Volatile Vitriol.

There are a great many other Chalybeates, even of Reputation ; as, one at *Tadcaſter*, one at *Atwith* near *Pontefract*, which by drinking and bathing has done great Cures in ſcrophulous caſes and Lameneſs : One at *Abledumar Black Barnſley* ; two or three at *Leeds*, one at *Redhill*, one at *Thornton-Ruſt* in the Pariſh of *Asker* in *Weachdale* ; one or two in *Swaledale*, another in *Arkendale*. Several of theſe come from Coal : But there is a very good one at *Stonny-Middleton*, *Derbyſhire* ; one near Mr. *Pole*'s of *Park-Hall*, two or three near *Romely*, the Country-ſeat of the worthy and ingenious *Tho: Wright*, Eſq; one in *Newall*-Wood near *Wakefield*, which is pretty light, taſtes ferruginous, ſmells a little of Sulphur, is a good Diuretic, drunk at the Spring ; but quickly loſes its Chalybeate Principle, if removed ; another at *Carleton* near *Barnſley*, called

Shaw-Spaw; another at *Dodworth*; one at *Worthy*. *Longaddingham* and *Skipton Sweet Spaw* are both of this ſort, tho' very light and weak. But it were endleſs to number up a third part of this Claſs in this Country.

I ſhall only add one more, *viz* that at *Henyworth*, near *Pontefract*. It ſprings up in a Cloſe, called, the *Stonney Paſtures*, North of the Town, has been known only ſixteen Years, and chiefly uſed by the late Reverend Mr. *Lampley*, and the preſent Reverend and Ingenious Mr. *Wrightſon*, of the Place; both they and I finding it a very good Stomachic and Diuretic. It throws out above 1500 Gallons of pure light Water in an Hour, of an agreeable Vitriolic Taſte and Smell, ſparkles like rich *Champaigne*, ſits light on the Stomach, goes off quickly, and excites a voracious Appetite, and has the other Properties of a light Chalybeate: Mixt with common Water, it makes a ſmall faint Violet-Blue; with Tincture of Galls, a deep Crimſon Red; with Brandy, a light Violet; with Tincture of Logwood, a fine light Blue; with Syrup of Violets, firſt blue, then greeniſh; with Oil of Tartar, firſt whitiſh, then lets fall a woolly ſediment; with Tincture of Rhubarb, firſt a deep Yellow, then a dark Brown, laſtly blackiſh; with Solution of Sugar of Lead, firſt whitiſh, then a ſmall white ſediment. Seven Quarts of it exhaled, left 22 Grains of a brackiſh light brown ſediment, ten Grains whereof were Earth; the filtred Liquor turned inſtantly white, and ſoon let fall a ſediment, with Spirit of Hartſhorn and Oil of Tartar.

Laſtly, *Bullhouſe-Spaw*. This in *February*, tho' a moſt rainy ſeaſon, ſtruck a deep rediſh, then bluiſh Tincture with Galls; was very little muddy, and poſited ſcarce any ſediment, with Spirit of Hartſhorn, or other Volatile Alcalies; was a noble Mazarine, with Tincture of Logwood. Fourteen Pints of it exhaled, left forty three Grains of a blackiſh ſaltiſh ſediment. It contains quadruple the Chalybeate Principle of any other Steel-Water in this Bounds; as alſo a much larger ſediment. Hence, no wonder, if it has gained a great Character in the Hyppo, Cachexy, and other Diſtempers from Relaxation, Obſtruction, or a grumous ſizey Blood.

148. From the whole, we obſerve, in the general, 1. That all thoſe called *Chalybeates*, are diuretic, deobſtruent, invigorating and ſtomachic. 2. They are known, from their ſtriking Purple with Brandy, Galls, *Sumach*, Red Roſes, Green Tea, Oak-Leaves, *&c.*

3. Their fixt Parts bear ſo ſmall a proportion to their Vehicle, that we derive their whole medicinal Virtues from their volatile Principles, *viz* their Spirit and volatile Vitriol; which being gone, little remains for the Drinker, beſides ſimple Element, and a little Earth; which, however the firſt may pall the Stomach, and load the Veſſels, the laſt is a very improper Meſſenger to ſend on the Errand of opening Obſtructions, and curing Diſeaſes thence ariſing. 4. The more Mineral Spirit, and volatile Vitriol theſe Waters contain, the more valuable and ſanative they are at the Spring-head; but the more improper for keeping, Carriage, and much Agitation. 5. Since they are not coacuent, but Alterative, we are not to ſwallow down ſuch large unconſcionable Doſes, as Dr. *French* preſcribes: For not Violence, but Patience and Regularity aſſiſt them in the Cure of Chronic Diſeaſes; a Quart, or three Pints a Day being an ordinary Doſe. 6. Since they are Alteratives only, and require Time, Patience, and Temperance, let none diſparage the Waters, or conclude them unprofitable to their Caſe, if they find not a Cure in a ſhort time. It is but reaſonable they ſhould allow as many Months for the Water to anſwer, as their Diſtemper has probably been Years, in gathering ſtrength; or Weeks, as they have had it Months. In other Countries, Patients can allow two or three whole Summer half Years, and find Relief at laſt; we only a few Weeks: Hence theſe Waters are generally more beneficial there than here.

Again, ſince theſe Waters are Alterative only, a Courſe of Purgatives interlaced with their uſe, ſeems highly unreaſonable, and inconſiſtent with the Deſign; ſince they weaken the Stomach, drain the Blood, and determine the Operation in that Way. And on the laſt Account, Diuretics are no leſs culpable, ſome few Caſes excepted. As for the Rules for drinking the Waters, and Uſe of the Non-naturals, nothing need be added to what Dr. *Dean* and Dr. *French* have ſaid on *Harrigate*. 7. We find, theſe Waters come from 1. Iron-ſtone; 2. Shale, or a Mixture of Shale and Iron-ſtone; 3. Coal, or a Mixture of Coal and Iron-ſtone Such as are derived from the firſt, are of a far more agreeable Taſte, ſit lighter upon the Stomach, are much ſooner expell'd the Body, and envigorate and exhilerate much more. Such as are the Product of Coal, as *Cheſterfield* and *Whittington*, *Sheffield Ponds*, *Melton* near *Rodhill*, and *Park-Hall Spaws*, are more nauſeues to the Taſte, load and weaken the Stomach, go ſlowly off, and leave a ſmarting diſagreeable ſenſation in the Throat.

8. The more Sulphur they contain, the more effectual is cold Bathing in them; but eſpecially, the uſe of their Scum and Clay, in Diſorders of the Skin; as, Ulcers, Eruptions, Excoriations and Corroſions. Hence *Guilethwait*, *Beverley*, &c. *Spaws* Clay and Oker are found moſt effectual. Their different proportions of Sulphur are diſcoverable from the Blackneſs of their Sludge, and from its Inflammability when dried. 9. Some of thoſe Waters contain a fixt, as well as volatile Vitriol; as *Fullwood*, lower *Normanſy*, *Middleton* by *Pickering*, *Mare-Spaw*, &c. which is diſcoverable from this; the ſediment remaining after Exhalation, being diſſolved and filtred, the filtred Liquor ſtrikes Purple with Galls, and Blue with Tincture of Logwood. Or, if you exhale the Water in the filtred Liquor, and diſſolve the dried Salt in Water, Green Tea, Galls and *Sumach*, all ſtrike this Solution Purple; which, I think, can ſcarce be deemed to be Vitriol. As to *Mare-Spaw*, I cannot poſſibly recollect from whence I had it, having loſt my Paper in which it was, and had only the ſediment remaining, which projected (upon ſeparation from its Earth) ſome very curious Rhomboid Cryſtals of immature Vitriol. However, the Loſs of this Paper can give no advantage to Dr. *Liſter*'s Diſciples; and the ſpeculative Gentlemen, who have, by ſome hocus-pocus Art, exorcis'd fixt Vitriol out of all Mineral Waters, as a rank Poyſon, and yet can very ſucceſsfully preſcribe Salt of Steel, *Vinum Chalybeatum*, Tincture, and other Preparations of Steel, which all contain Vitriol; this, I ſay, can do them no ſervice, ſince we can direct them to many other Chalybeate Waters we know, which contain fixt Vitriol.

149. All Coal-Waters in this Country contain fixt Vitriol; as, thoſe above *Buxton*, call'd the *Allum-Wells*, *Weſtwood Spring* near *Tanderſley*, &c. which is diſcoverable from the Waters ſtriking blue with Tincture of Galls, inſtead of Purple: And the Waters exhal'd, the Salt ſeparated from the Earth, and ſet to cryſtallize, you have beautiful Cryſtals of mature Vitriol, and no other Salt. They alſo make a moſt beautiful clear Poſſet-drink, ſquirted into New Milk, if they are full of Vitriol, as *Weſtwood*. This (and I doubt not, but the reſt are the ſame, in proportion to their Vitriol) moſt effectually and certainly cures the moſt ſtubborn and Chronic Ulcers, eſpecially thoſe of the Legs, which often prove the Reproach of Phyſick; nor will they yield to a Salivation, very often. I had a Servant-Maid, who had, (before ſhe came to me) the moſt frightful, and even monſtrous ulcerated Leg I ever ſaw, for five Years, prodigiouſly ſwell'd,

livid and uſeleſs; a Man might have hid his Fiſt in one Ulcer; very foul, and of a blackiſh green Colour. Her Parents and ſhe uſed all the Means they could poſſibly procure, but in vain, till I adviſ'd her to waſh it twice a day at home with this Water, which cured it in three Months time, tho' ſhe had plied it twice as long with *Guilthwait*-Water and Clay, to no purpoſe. My Servant-Boy received a Hurt by a Horſe upon his Shin, which, in ſpite of Driers, Healers, and red Precipitate outwardly, and Calomel and Calomel-Purges inwardly, turned to an Ulcer at ſix Months end: But one Quart-Bottle of this Water cured it, took off the ſwelling, and reſtored his Limb. A young Gentlewoman had a very ſmall Sore on her Leg for ſome time. I adviſed to the Uſe of *Harrigate-Sulphur-Water*; ſhe went, and bid Good-morrow to the Place, returned the ſame Week uncured; took abundance of Calomel, then was ſalivated, uſed Decoctions of the Wood, *&c.* but all in vain. I intreated her to uſe this Water, which would certainly cure her: But this friendly Advice was too ſimple and plain for Madam; ſhe liked Phyſick better, and a ſore Leg. I heard ſix Months after, it was *in ſtatu quo*; and what became of it after, I have not heard: But, very likely, it prov'd, at leaſt, an annual Ulcer.

PART IV. and V.

Of Purging and Plain Sulphur-Waters.

150. THESE are of three ſorts, *viz.* ſuch as contain only Marine Salt; ſuch as carry in them Marine Salt and Nitre; and ſuch as have Nitre only. Of theſe we ſhall begin with *Harrigate*; which certainly is the moſt incomparably ſtrong Sulphur-water in *Britain*. There are ſeveral of them here.

151. They lie in the following Order: About a Mile and quarter Weſt of *Harrigate*, on the Brook-ſide, is a ſmall Out-break of a ſtrong, ſaline, ſulphureous Spring, which blackens the Water of the Brook, and makes the Earth of a deep Ink-black Colour. A Mile Eaſt of this, in the Bogg above the Village, we find ſeveral more of theſe Springs. About thirty Years ago, when the Concourſe of People was very great to this *Spaw*, one *Robert Ward*, an old Man, made a Baſon in the Clay, under the Moſs of a Bogg, where the ſtrongeſt and briskeſt of thoſe Sulphur-Springs riſe; and gathered half a Hogſhead of Water at a time, for the uſe of the Poor: But when he laded this, he almoſt dried the three Sulphur-Wells at the Village: Whence it is evident, they all have the ſame Origine, and communicate with one another.

This Baſon was about ſix Yards North-Weſt of the Allum-Well. See how near Springs of a very different nature are to one another! Even in a looſe Bogg, inacceſſible in great Rains, which yet never affect theſe Springs. Near five hundred Yards Eaſt of the Bogg, over a ſmall dry Hill, lies the firſt of the three Sulphur-Wells, on the North ſide of the Village. A Yard Eaſt of this, is the ſecond; and five Yards and a half Eaſt of this, riſes up the third. Theſe three being the only Springs of this kind in uſe here, they have very pretty little Stone-Baſons laid for the Water to riſe up into, and are each encloſ'd in a ſmall neat Building of Stone and Lime, about a

Yard ſquare on the Inſides, and near two Yards high, covered over with two thick ſmooth Flag-ſtones laid ſhelving. After the Water is emptied out of the Baſons (which by ſome poor old Women there are always kept exceeding clean) and ſtagnates for ſome Hours between the Baſon and Brook, the Earth where it ſtands, is Ink-black, and in Summer it is covered with a thick white dry Scum; which taken off, and dried in the Sun, burns in the Fire with a blue Flame, and ſtrong ſmell of Sulphur; the ſame does the black Mud at bottom when divided. When Dr. *George Neal* of *Leeds* attended this Place, (which he, and his Son, the late Dr. *John Neal* of *Doncaſter*, did for ſixty ſeven Years [a]) they were oblig'd to lade up the Baſons,

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[a] This is a begun Piece, which was never finiſh'd, though he liv'd many Years after. He had made and prepar'd a very curious Collection of Obſervations, which are either loſt, lent out, or miſ-laid; ſo that the late Doctor's Widow (who freely gave the following Fragment, to be communicated to the Publick) could not find it, after a moſt ſtrict and careful Search.

Spadacrene Eboracenſis: Or, *The Yorkſhire Spaws,* near *Knaresburgh*: Being a Deſcription of Five famous Medicinal Wells, *viz.* 1. The Sweet Spaw. 2. The Sulphur, or ſtinking Well. 3. The Dropping Well. 4 The Black Spring, found out by the Author. 5. St. *Magnus*'s, or St. *Mungo*'s Well. All which Wells, with their Situation, Operation, Virtues, *&c.* are deſcribed. Together with the Hot and Cold Baths; as likewiſe Fume-Baths. By *Geo. Neale,* ſen. M. D.

I ſhall begin with the Sweet Spaw. This riſes very pleaſantly, on a fine Aſcent, for a Mile, or more, of Ground, bubling up with a good Stream. It continually throws up ſmall Sand, or Gravel; a good ſign of a perpetual Spring, which never fails Winter nor Summer, in Drought nor Rain; but continues the ſame Stream, enough to ſuffice thouſands of Drinkers.

I was at the firſt opening of the Ground, when the Trenches were digg'd, the Breaſt-work and the Walks made; which were done without due Conſideration, and many Inconveniencies ſucceeded; as, to draw from upper Grounds all Rain-Water, by digging ſo deep upon the Weſt and North-weſt ſide, that all the Spring was drawn away, and the Baſon empty in an Afternoon, when there was the greateſt Appearance of Water-drinkers of all Ranks I ever ſaw. I was not a little troubled at the Capriciouſneſs of the Perſon who carried on the whole Deſign, to aggrandize himſelf with the Benevolence of the Benefactors; and with Tears in my Eye, preſently got Workmen, to fill up, firſt with Earth and Stones, then with Sodds of Earth well rammed down, and with Gravel, Hurdles, Branches of Trees, filled up the Trench, and ſodded it over at laſt, or we had loſt our Spring: For it got Vent into the Boggs Weſt and North-weſt from the Fountain-head, and ruin'd us.

I obſerv'd, all the Ground about the Wells, after it was open'd about half a Yard deep upon the North and South-Eaſt ſide eſpecially, was a bluiſh kind of Clay, which taſted of Vitriol. Many Iron-ſtones were thrown up (all the Ground thereabout being formerly digg'd up, and all the Wood deſtroyed in Queen *Elizabeth*'s time, by Iron-Forges) that the Spring paſſing through both *in ſolutis Principiis*, muſt ſons (the Water having found ſome other Outlet,) and under them they found great Quantities of yellow ſublimed Flowers of Sulphur; and a Man may at any time precipitate a ſix'd Sulphur in thoſe Waters. Old Rags, Straw, Sticks, Leaves, Graſs or Moſs lying in the Courſe of thoſe Waters, are covered with a white hairy Mucus. A Mile Eaſt of this, in the Middle Way to *Knaresburgh*, in a low Ground, by a ſmall Brook-ſide, riſes up *Knaresburgh Sulphur-Water*. Half a Mile North from this, is *Bitton-Spaw*, in the Park, near by Mr. *Stoughton's*.

muſt partake of both. Yet one Mineral more muſt be allow'd, *viz.* Nitre, which abounds in all fat Clayie Earth: For if you diſſolve it in Water, filter and evaporate it, you drein the Salt of Nitre from it, and by Evaporation make Salt-Petre of it, as has formerly been done in moſt parts of this Kingdom, to make Gunpowder. Let this waſh'd Earth be again expoſed to the Air, and in ſix or ſeven Years, it will be as full of Nitre as ever: Nay, the very Nitre of the Air unites it ſelf with the Vitriol of the Spring, and to the Water, as we drink it; and will, as quickly as you can fill a Glaſs, cover it with a thin Cloud that foretels what Weather you are to expect. The neceſſity of Nitre in the Air, for preſerving Animal Life, is now very obvious to Philoſophers, for rarefying, enlivening and inflaming our Blood and Spirits; ſo to attenuate them, as to make a Paſſage and Circulation thro' all Parts of the Body: For the Nitre, together with the Air, is drawn into the Lungs, mixt there with the Blood, and thence preſently tranſmitted to the Heart.

From what I have ſaid, I am inclined to think, that the Water of this Spring contains Nitre, Vitriol and *Mars*, which are the uſefulleſt Principles any Mineral can be impregnated with; all of them being of great uſe for our Preſervation; and we cannot live many Moments without Nitre; ſo it is diſputable, whether Vitriol or Iron may be ſpared.

As to the Virtues of this Spring, there is ſcarce any Diſeaſe incident to Mankind, wherein its inward or outward Uſe may not be of ſervice. I have been an Eye-witneſs near forty Years of its Effects; and I have not neglected drinking it my ſelf, any one Seaſon all that time; and tho' I am now in my 66th Year, yet I am ſtrong and vigorous, free from the Complaints of Old Age: Nay, let me add further, that it often finds out a Diſtemper ſooner than a Phyſician: For when I have met with Patients labouring under ſuch a Complication of Chronic Diſeaſes, that I ſcarce knew which chief Symptoms to relieve firſt, I have cauſed them to drink of this *Spaw* three or four Days, or longer, (giving only a gentle Preparatory to open the Paſſages) and it ſeldom fails to indicate where the greateſt ſtreſs lies, and point out the Method of Cure, by working chiefly on the Parts affected.

But becauſe a general and juſt Commendation of this Spring will not be ſatisfactory, without condeſcending to enumerate the Diſeaſes wherein it's proper, and ſome Directions for its Doſe, Uſe, and how to prepare the Body for it; It's good therefore, to reſtore a loſt Appetite and Digeſtion, to mitigate the Scurvy, correct all acid Humours in the *Lympha*, Blood, nervous and pancreatic Juices. It cleanſes the Kidnies and Ureters of Slime, Sand, Gravel and great Stones, and is very aſſiſtant in curing Ulcers in thoſe Parts. It removes the Hyppo's Melancholy, opens Obſtructions of the Lungs, Liver, Spleen, Meſentery and Glands. It purifies the Blood, and renders the Spirits in the Body more chearful and lively. Several *ſhort-winded*, Aſthmatic, weak,

and

ton's. Theſe three firſt ſend forth ſuch a ſtrong ſmell, that it is perceived at a good Diſtance by Travellers, in moiſt and rainy Weather; and before Rain, they bubble up with ſuch an impetuous force, that they are heard a good way off; though neither Rain nor Drought increaſes or decreaſes their Springs. Hither alſo the Pidgeons reſort from all Parts about, to pick up the candied Sea-ſalts, which

and lame People, have had their Lungs and Limbs reſtored to their former ſtrength and uſefulneſs. It relieves inveterate Head-Aches, eſpecially if at the ſame time you uſe the Cold Bath. It is alſo very ſerviceable in the Gout, by reſtoring the Uſe of lame Hands, Knees, Legs and Feet. It revives the Memory, clears the Brain from viſcous Humours, and helps the Eyes, by drying up Rheums. It relieves ſharpneſs of Urine, Strangury and Diſury, if there is no large Stone or other ſtoppage in the urinary Paſſages. It corrects Acidity in any part of the Body; as in the Heart-burn, Belchings, Sourneſs at the Stomach, Gripes, Cholic, and *Borbarigmos*. It opens the Breaſt and Lungs, cuts tough Flegm, promotes Expectoration, and has often been ſucceſsful in the Cure of Blood-ſpitting, Hectic Fever, too great Heat and Dryneſs of the Skin and Body. But I would diſſuade from the uſe of it, ſuch as have a vehement Cough, raiſe up much tough Flegm, and are much worn out by a Conſumption.

As to drinking the Waters, the ſame Doſe is not to be preſcribed to all, even tho' they are near the ſame Age, Strength and Diſtemper: But let them begin with a moderate Doſe, as, three Pints, or two Quarts at firſt; and add to this, for three days after, a Glaſs or two more; which let be your fixt Quantity, provided it go readily off the Body; if not, let a Phyſician be conſulted preſently, who is a proper Judge of the Diſtemper, and this Water. As for my Patients, three Quarts apiece in a Forenoon is their common Doſe, together with moderate Exerciſe, as eaſie Walking, Riding on Horſe-back or in a Coach or Chariot, whereby the Water is better diſtributed through the whole Body, mixt with the Blood, goes ſooner off, and more effectually anſwers the deſign. I have, not ſeldom, ſeen ſeveral weak People, as well as ſtrong, drink eight, twelve, or ſixteen Pints apiece in a Forenoon; but never could ſee any ſuch Gluttons reap more benefit than the moderate Drinkers: For certainly, a moderate quantity, (allowing a longer time to the Uſe of the Water) will anſwer all intents with more ſafety, and to better purpoſe. I have obſerved, that Choleric People may drink a larger quantity with more benefit than others: And indeed, as they have a greater Heat, Thirſt, quicker Circulation of the Blood, and ſharper Humours than others, their Conſtitution ſeems to require.

The proper time to begin to drink, is, from half an Hour, to two Hours after Sun-riſing, in *May*, *June*, *July*, and *Auguſt*, theſe being the propereſt Months in the Year, except in caſe of Neceſſity, and then, with due Care, they may be uſed at any time. They muſt be drunk upon an empty Stomach, except you take ſome preparatory Medicine before; then a ſhort Walk betwixt that and the Waters is not amiſs, to warm the Body, and procure the Water a readier Paſſage. Several weak People drink either all, or a part of their Doſe in Bed; and we find that every whit anſwers as well, only they drink a ſmaller quantity. But Exerciſe, and the thin freſh Air contribute not a little to the Patients Recovery; and there is no finer, freſher Air in *England*, than at *Harigate*, as is generally and juſtly owned by all Strangers.

As to drinking this Water in the Afternoon, it muſt not be allowed in any great which are much ſtronger here than at the Sea, becauſe of the adherent Sulphur. This Place and the Foreſt were formerly ſo thick of Wood, that he was thought a cunning Fellow, that could readily find out thoſe *Spaws*, tho' there is not now one Tree out of the Park.

This

great quantity (tho' it be the Cuſtom at *Tunbridge*, *Aſtrope*, and other Chalybeate Springs;) for there is not a due time to digeſt the Waters before Supper: But there is no harm, if Perſons of an hot Conſtitution drink a Pint of it between four and five a-clock; a Precedent not to be imitated by phlegmatic People, and ſuch as have Rheums and Catarrhs. Such as are troubled with a Dryneſs of their Mouth and Throat in the Night, or Thirſt which diſturbs their Reſt, may not only drink two or three Glaſſes of it in the Afternoon, but carry a Bottle of it to Bed, and drink it when they have occaſion. Thoſe alſo who labour under the Hyppo, Sand, Gravel, ſmall Stones, or a Stoppage or Heat of Urine, may ſafely and advantageouſly drink a Pint of it in the Afternoon.

I have obſerved ſeveral Strangers here, who by hard Travel, hot Weather, Duſt, and long Journies, have been ſeized with a violent Fever, which has requir'd Bleeding; then give this Water, with a little Syrup of Violets, and the Fever is carried off to admiration, by Urine, Sweat and gentle Laxatives; tho' the Patients have owned, that the like Fever (without this help) has formerly confined them near three Weeks to Bed.

It has alſo been query'd, whether the Uſe of this Water with Wine may not be a proper Drink for Dinner and Supper, inſtead of common Water? But I anſwer, that Water mixt with Wine is too great a Diuretic, and haſtens the Chyle out of the Stomach, before it is well prepar'd and digeſted. Hence the Kidnies ſtrein it off haſtily, and may ſometimes leave ſuch coarſe Matter, as may occaſion the Stone or Gravel in thoſe parts; which falling into the Bladder, may quickly become too large to be expell'd by Urine, or paſs eaſily the *Urethra*, except timely prevented by fit Medicines. Such as chuſe Water to their Wine, may be ſupplied from ſeveral good Springs of common Water.

As to what diſtance this Chalybeate Water may be carried from the Spring, without Loſs of ſome of its Parts or Virtue; if it is taken up in the Night, bottled and cork'd well, it may be tranſported 14, 16, or 20 Miles; but if it is much heated in the Carriage, it loſes much of its Virtue and Operation, by the Loſs of its Volatile Spirit, and letting fall to the bottom ſome of its Minerals: Therefore, as Servants cannot be too cautious in carrying it away; ſo it's beſt drunk at the Spring: But for the ſick and weak, which cannot, without danger, come to the *Spaw*, the water may be of ſervice, eſpecially if ſome Medicines be added to it proper for the Diſeaſe, and akin to the diminiſh'd or loſt Parts.

In the laſt place, I ſhall here preſcribe ſome general Remedies, which I have made uſe of with great ſucceſs, to many infirm Perſons; but ſelect Medicines muſt be order'd, and given in particular Diſeaſes, according to the preſent Symptoms and Neceſſity.

Take of Lenitive Electuary, *Diacatholicon*, of each one Ounce and half; Cream of Tartar, Pouder of Jalap, of each one Dram; Reſin of Scamony pouder'd, eight Grains; freſh Syrup of Violets, four Drams and half; ſtrong Cinamon-water, one Dram: Make an Electuary. *Doſe*, from half an Ounce to an Ounce; Early in the Morning, for a Preparative before you begin to drink. And if the Day is fair, and the Air temperate, they may walk abroad, and drink of the

Spaw,

This Water mixt with Ale, certainly makes the moſt intolerably nauſeous Draught in nature. A Stranger to the trick would certainly call for an Attorney to make his Will, if not done before: Or, the Water put to working Ale,, puts an inſtant ſtop to its further Fermentation.

Spaw. The following is fitter for ſtronger Conſtitutions.

Take of the Electuaries *Diaphœnicon* and *Diacatholicon*, of each one Ounce and half; Cream of Tartar, one Dram and half; Pouder of Jalap, one dram; Reſin of Jalap, 26 grains; freſh Syrup of Damask-Roſes and Violets, of each three drams; *Aqu. Mirabilis*, one dram and half. Prepare all, mix, and make an Electuary. Doſe one ounce, or ten drams; drinking after it, within an Hour, two or three Pints of the Sulphur-water, and afterwards two or three Pints of the Sweet Spaw. Women with Child, and Children may uſe the following ſafely:

Take of the Magiſtral Syrup for Melancholy, one pound; purging Syrup of Apples, three ounces; *Miſce.* Doſe, one ounce before the Water, then two or three draughts of the Sweet Spaw after. Some may take, Syrup of Buckthorn, one ounce, mixt with the firſt draught of the Spaw-water. A Child may take, from half an ounce to an ounce of Syrup of Violets, mixt with ſeveral draughts of the *Spaw*; or freſh Syrup of Damask-Roſes; or Syrup of Peach-Flowers, ſix drams; or Syrup of Rhubarb. Adults may ſwallow one or two of the following Pills at night, and as many in the morning: And if the Seaſon is warm, he may drink of one, or both *Spaws* after, as his Phyſician ſees proper.

Take of ſtomachic Pills with the Gums, Aloephangine Pills, of each half an ounce; Extract of *Rudius*, two drams; Salt of Tartar and Wormwood, of each half a ſcruple; Reſin of Scamony and Jalap, of each eight grains: Chymical Oils of Cinamon and Nutmeg, of each two drops; Syrup of Violets, enough to make a Maſs of Pills. Or, let them take one or two of our *Spaw*-Pills (the Receipt whereof follows) at Bed-time, and as many in the Morning, and drink either *Spaw*, or Sulphur-water after.

Take Gum *Taccamahaca*, *Carrana*, Ammoniac, of each (diſſolved in Vinegar of Squills) two drams; Salt of Wormwood, Salt of the Sulphur-Well, well purified, of each half an ounce; Root of Aromatic Reed, Juniper-Berries, Aloes-Wood, Cinamon, Mace, Cloves, Nutmeg, leſſer Cardamom-ſeeds, Tops of dried Wormwood and Mint, of each two drams. Let the laſt ten be groſsly pouder'd, and a fine Tincture drawn from them in two pounds of rectified Spirit of Wine In the ſtreined Liquor infuſe Rhubarb and Agaric, of each one ounce and half; Sena one ounce; Reſin of Scamony and Jalap, of each four drams; beſt ſuccotrine Aloes, one pound. All theſe (except the laſt) being well pouder'd; and when the Aloes is diſſolved, add Pouders of Maſtic, Myrrh, Olibanum, of each two drams and half; Pouder of Saffron four drams; Balſam of *Gilead* and *Chili*, of each one dram and half; Calomel, two ounces. Mix all well: Let the ſuperfluous Humidity exhale over warm Aſhes, till they are reduced to a proper Conſiſtence. This Maſs of Pills carefully made, will commend it ſelf, as well in the Uſe of the Waters, as

without

tion. The Soil, out of which theſe Springs riſe, is, firſt, Corn-mould; then a Marle Lime ſtone, ſo abraded by the Salt in the Water, that when dried, it ſwims in Water. There is alſo a Stratum of Plaiſter. Theſe Sulphur-Waters lie pretty much in a Line from

Weſt

without them, againſt moſt Diſeaſes incident to humane Bodies; being compoſed of the choiceſt Medicines to carry off all vitious Humours from the Body, with much Eaſe, and without Gripings. Theſe I continually carry with me there, and find them anſwer the Expectation of both Phyſician and Patient.

Of the Sulphur, or Stinking Well.

Here are, and were, about twenty years ago, three Springs cloſe together, very low, and ſcarce of Water, that all of them did not afford ſufficient Water for drinking and bathing. Wherefore, for the greater Convenience of the Drinkers, I thought it convenient to take up the uppermoſt Spring, which is weakeſt, and floweſt of them, and made a large Baſon to contain ſeveral Hogſheads of Water, and covered it with a large Stone, to preſerve it from the Sun and Rain-water; and for a Week together we rammed its ſides with Clay, to prevent other Springs from getting in. The Event anſwered Expectation: For we had a freſh Spring of much better and ſtronger Water, which afforded as much in one Hour now, as it did in twenty four before, more loaded with the Minerals than ever, and ſo of greater Efficacy for either Bathing or Drinking.

This Spring partakes of Sulphur, Vitriol, Nitre, Copper and Salt; all theſe lying *in ſolutis Principiis* in that Earth, which, if you dig up, you may ſeparate. The Earth about theſe, and ſome other *Spaws* in Boggs, is black and bituminous, the ſurface whereof in hot Weather is candied over with a yellow ſcurf, which is perfect Brimſtone: For, put in the Fire, it burns blue, and ſmells ſtrong of Sulphur. You may alſo obſerve a Scum on the ſtagnant Sulphur-water; which carefully skimmed off with fine Paper, and dried in the Sun, burns blue in the Fire, and ſmells of Sulphur. When I took up the Baſon of the upper Spring, compoſed of two Stones joined together, I found ſeveral Handfuls of fine Flowers of Brimſtone, ſticking to the under ſide of the Stones, which I gather'd, and preſented to ſeveral Perſons of Quality preſent. This was Conviction to a certain Author, who lately in Print confidently denied the Exiſtence of Sulphur in this Water, but now retracts it heartily.

The next Ingredient is Vitriol, which you may gather above Ground at the Spring-ſide. Beſide, I have often digg'd in the Bogg above (which is full of thoſe Sulphur-ſprings) and in dry Weather you may find ſeveral Glebes or Marcaſites tinged yellow with Copper, ſhining like Gold; which laid by in a Cellar, afford ſoft Efloreſcences; which wipe off with a Feather, and lay them in their place again, and they will throw forth more of the ſame. Diſſolve theſe in Rain-water, and you will have good Vitriol.

The third Ingredient is Nitre, which is in all Fat Earth, but eſpecially in this black bituminous. The Ground both about thoſe Springs, and of two little Hills by them, is full of a coarſe Lime, as Pumice-ſtone; the Rain-water, and that of the Springs having waſh'd out its Salt, which may be ſeen and gather'd on the ſides of thoſe Hills.

The Fourth Principle is Copper, which is ſeparable from the reſt of the Minerals; but theſe gliſtering Glebes, or Marcaſites mentioned before, that in dry Weather are tinged of a Gold-colour, plainly ſhews them to be gilt with Copper; and the Taſte of them is not unlike it: But the

Vitriol

Weſt to Eaſt, on the North ſide of *Knaresburgh*-Foreſt, in the Pariſh of *Panal*; parted from *Knaresburgh*-Pariſh only by a ſmall Brook, called *Sulphur-Well Beck.*

Vitriol and Nitre are mix'd, yielding a ſalt bitter Taſte, with a ſmack of Copper.

The laſt Ingredient is Salt, diſtinguiſhable by its Taſte and Brackiſhneſs; but the Inhabitants near the Wells, yearly, when the Company is gone, boil great quantities of the Water, and procure Salt from it, which is ſold in the Country, and ſent up to *London*. A Gallon of Water, either in a Drought, or hard Froſt, yields one Ounce of Salt; but at other times it's leſs.

Now, to the Diſeaſes wherein this Water is proper, and which we daily ſee it cure, in ſuch as are regular, and comply with neceſſary Rules. Tho' it is very clear and tranſparent in a Glaſs, yet from the above Principles, it muſt be very ſaponacious, cleanſing and opening. Hence it is fit for carrying off all vicious Humours from the Inteſtines, as ſlimy and mucous Matter; opens Obſtructions of the Liver and other *Viſcera*: And tho' it purges ſharply, yet even during the Operation, the Drinker may perceive his Spirits raiſed; he is more chearful, active, and vigorous. It reſiſts all corrupt Humours, creates a keen Stomach and quick Digeſtion. It cures the Scurvy better than all other Medicines. It's no leſs ſucceſsful in a recent Dropſy, where the Lymphatics are not broke, nor the Waters extravaſated, nor the *Viſcera* tainted; and that by drinking, bathing and ſweating. By frequent and long Experience, I have ſeen it help the Jaundice, tho' of many Years ſtanding. It kills and expels all ſorts of Worms, together with that Slime in the Bowels which is their Neſt; wherein I have often found a round black Speck like Seed, which, I'm certain, they breed from, and which being evacuated, the Perſons were entirely cured, or free from Worms many Years after. And tho' the Worms were carry'd off, yet while the Slime and theſe Seeds continued, we could not promiſe a full Cure. It's alike effectual in the broad and round Worms, and *Aſcarides*. Some of the laſt have had ſtrange ſhap'd Heads of divers Colours, and ſometimes in ſurpriſing Quantities; but then we found them link'd, glew'd, or join'd to a long Chain of Flegm, often above two Yards in length; as in Sir *W. Fenton*'s and Capt. *Steninton*'s Caſes. But beſides theſe three ſorts, here are other ſtrange Worms, or various Inſects oftentimes expell'd, with monſtrous Shapes and Heads, like a Dog or a Wolf; ſometimes four Feet, two towards the Head, and two near the Tail, of a brown Colour. Some of the broad Worms were above two or three Yards long, and ſome of 'em at an Inch or two diſtance, joynted, and cover'd with ſmall white Hair. It cured internal Ulcers both in the Neck of the Bladder and *Anus*, from a Venereal Cauſe, in a Gentleman of good Quality, who had ſpent his Relations much Money before he came to this Water. The like I have obſerv'd in ſeveral Caſes of that loathſome Diſeaſe, wherein it gives Help and Cure both inwardly and outwardly, ſooner, and with leſs trouble than the Methods heretofore uſed. It prevents the Attack, and if recent, cures ſeveral Diſeaſes ariſing from the Scurvy; as, an Aſthma, vertiginous Motions in the Head, *Scotomia*, Paralitical Diſtempers, ſlight Fits of an Apoplexy, a Phthiſical Shortneſs of Breath. It relieves the Stomach, and if drunk firſt leiſurely, to move ill Humors there, and afterwards quickly, it ſtirs up Vomiting, and frees it from much Flegm, Choler, and other ſharp Humors that diſturb the Animal Oeconomy.

In great Obſtructions of the Bowels, in great and obſtinate Obſtructions of the Bowels and *Viſcera*, Gripes, Flatulency, and much Pain; in plethoric and flegmatic ic Conſtitutions eſpecially, it carries off much Flegm, Choler, and acid Humors, to a Wonder, warming and refreſhing all thoſe tender and membranous Parts, by gentle Heat. It is ſurpriſing to ſee what quantities, and with how much irregularity the Foreſters, who flock thither in Multitudes on Holidays, drink, contemning all Advice, and vying with one another who can drink moſt; yet no Complaint from all this. But we adviſe our Patients to drink only three or four Pints. Few drink three Quarts, only as their Stomachs can bear and digeſt it. Such as have cold Stomachs, and weak Digeſtion, I cauſe to begin with Sulphur-Water; and when that has operated, and open'd the firſt Paſſages, and clear'd them, then to the Sweet Spaw, and drink that as they find it agree with them, proportioning their Doſe to their Strength and its eaſy Paſſage. But ſuch as are of a hot and dry Conſtitution, let them begin with a Pint and half of the Sweet Spaw, then to the Sulphur-Well; for the Body requires ſome of the Water, to compenſate the loſs of its Fluids. And tho' hereby the Sulphur is not ſo quick in its Operation, yet it works more agreeably afterwards. But in general, for weak and infirm Perſons, there is a great deal of care to be taken, both in preparing their Body for the Water, and putting them in a proper Regimen.

Now, as to the external Cures performed by this Water, they are ſo many and various, as ſcarce to be enumerated; only I ſhall give ſome ſhort hints of what I have ſeen it do.

It's now thirty Years ago, ſince I ſet up firſt warm Bathing in this Water, and procured one ſuch Veſſel for a Pattern, as are uſed beyond Sea for that purpoſe; and now there are above twenty Bathing Houſes kept here, with all neceſſary Conveniencies, and all full employed in the Seaſon: And ſeveral, who have viſited both the *Bath* in *Somerſetſhire*, and this, have freely owned, they have reap'd more Benefit from the laſt than the firſt. This Bath does much good in Aches, Pains, Bruiſes, Strains, Lameneſs in the Limbs, Weakneſs of the Back, from Scurvy, Cold and Wet eſpecially, for a Dropſy in the beginning thereof; for paralitic Pains and Weakneſs, if the Parts have not been long weakned, the Solids emaciated, and Spirits exhauſted thereby. In this caſe, the Bath proves more effectual, if ſome ſuitable Plants be boiled in a little of the Sulphur-water, and mixt with the Bath; as, Sage, Angelica, Lavender, Sweet Marjoram, Fennel, with ſome warm Seeds and Berries. Neither would it be improper, after Bathing and Sweating, to apply to the Parts, Ointments or Liniments, with Chymical Oils and Spirits.

It is good in the Sciatica and Gout, Pains of Hands, Feet or Legs, ſtrengthening and reſtoring the Parts. Bathers go into it moderately warm at firſt, and increaſe its Heat by degrees, as the Patient ſweats: But weak Perſons can neither bear it ſo hot, nor ſweat ſo much as ſtrong People; they ordinarily continue an Hour in it. Such as have Complaints or Aches in the Head or Neck, have ſome warm Sulphur-Water poured on the back part of their Head, before they come out of the Bath; and then the Parts are well rubb'd with a warm Cloth. They ſhould not go into the Bath too hot at firſt: For it puts them into a violent Heat and Sweating, makes them faint and ſick, that they are forc'd to come out, and ſo loſe the Benefit of the Bath, if no greater Miſchief. Neither ſhould they go in with a full Stomach. If they bathe in a Morning, let them eat a little Gruel, or Broth, or a poach'd Egg, or ſomething of light and eaſy Digeſtion, an hour or two before they go in; but if they dine, they muſt not go in for four hours after. Some prefer bathing at Night; and if they have eat a light Supper, and ſtay at the bathing Houſe all Night, to prevent catching cold, they loſe no time for drinking the Water next Morning. Having got the Sweating over by ten or eleven a-clock, then got up, had their Bed made, eaten ſome light Food, they may go to Reſt till the Morning.

Thus finiſhes our Author, having referred us to a great many Obſervations, which are loſt.

151. The Water of the firſt of theſe three Sulphur-Wells weighs ſeventy two Grains in a Pint heavier than common Water, and throws out 368 Pints in an Hour. The Spirits in the Thermometer ſubſided three Eighths of an Inch lower in it than in common Water.

The ſecond, or middle Spring weighs only thirty two Grains in a Pint heavier, and the Spirits in the Thermometer ſubſide only one Eighth of an Inch lower in it than in common Water, and afford twenty Pints of Water in an Hour.

The third Spring, or that next the Eaſt, tho' the firſt found, built and us'd, ſends out forty nine Pints and an half of Water in an Hour, and weighs fifty eight Grains in a Pint heavier than common Water: The Spirits ſubſide three eighths of an Inch more in it than in the Brook; which yet is a Spring which riſes up a little above. Half a Crown laid in a Glaſs of this Water freſh, it became Jet-black in a quarter of an hour; twelve Drops of Solution of Gold in two Ounces of the Water, turn'd the firſt and third Wells black and thick; they preſently crudled, and let fall a very large black ſediment; and after four Hours ſtanding, the Liquor above was perfectly clear. The Water of the ſecond was a deep rediſh Black, was longer in crudling, and let fall leſs ſediment. The Liquor above was greeniſh; but being uncertain whether this was the effect of the *Aqua fortis*, or Gold, I laid my Gold-Watch in a Tea-Saucer full of the Water, it preſently turn'd green, crudled, and let fall a large ſediment, as before. This Water mixt with Red Port-Wine, was firſt a fine diluted ſparkling Red, then a fine Purple, next Morning a whitiſh Purple. Solution of Gold, four Drops made four Ounces of each of thoſe Waters exceeding black; they preſently let fall a black ſediment, which at firſt hung on the bottom and ſides of the Glaſſes, then roſe up to the top in black Flakes, like Pieces of Bladder. The ſame it was with Solution of Silver, and alſo with Solution of Copper; only the Colour was a rediſh Brown. They were firſt of a beautiful deep Yellow, with Tincture of Nephritic Wood, then a whitiſh Yellow, then crudled rediſh Yellow with Solution of Sublimate. I tried the laſt Experiment the Summer after, and the Water was Jet-black. It was Milk-white with Spirits of Hartſhorn, browniſh red with Tincture of Rhubarb: It was black, crudled, and let fall a great ſediment, with Solution of Sugar of Lead. It was white as Milk with Oil of Tartar, then crudled, and let fall a large white ſediment. The Liquor above was clear; but the Water of the third Well was black; as was alſo a Bottle of the ſame Water, when brought home, and kept eight Months; it ſtill ſtunk at the Expiration of that time, tho' not ſo ſtrong as at the Spring. It alſo was black with Gold, Silver, and Sugar of Lead Solutions. The Water at the Spring was firſt clear, then whitiſh, with Spirit of Vitriol. It was whitiſh clear, without Scum, Sediment, or Incruſtation, with Spirit of Salt. It was a pale White with Syrup of Violets. They are all red with Tincture of *Braſil* Wood; a pale Yellow, but at the Eye a muddy light Brown, with Tincture of Logwood. Galls, Green Tea, *Sumach*, *&c.* only made it muddy, without the leaſt purple Caſt. This Water crudles Milk, and throws Soap into hard Flakes. A Gallon of the upper Well (or that commonly drunk) exhaled, left near two Ounces of Salt. A Gallon of the middle Well left half an Ounce of ſediment. A Gallon of the loweſt Well afforded about an Ounce and half of ſediment. The ſediment of the firſt contain'd near two ſcruples of Earth. The ſediment of the ſecond afforded ſeven ſcruples of Earth. The ſediment of the third had ſeventeen Grains of Earth. The ſediment of the firſt Well is to its Vehicle, as 1 to 64; the ſediment of the ſecond, as 1 to 279; the ſediment of the third, to its Vehicle, as 1 to 125. Theſe Salts, upon Cryſtalization, prov'd all Marine Salt only.

153 I examin'd theſe Waters again *Aug.* 1, 6, as I had done before, *Oct.* 6, 7 8, and diſcover'd no Variation: Then I diſtill'd three Gallons of the Water, and took only three Pints off; the laſt was as ſtrong as the firſt, was a dark brown Colour, and ſtunk intolerably; it was black, and precipitated with Solutions of Silver, Copper, Sublimate, Oil of Tartar, and Sugar of Lead. The freſh Water kills Worms, or other Vermin in an Hour or two. The black ſlimy Mud in the Stream, being dried, ſends out much blue Smoak, a little Flame, and ſtinks intolerably on a red-hot Iron. The Mineral ſubſtance, or Concretions in the Bog ſtrike Fire, burn blue, ſmoak little, but fill the Room with a ſtrong ſmell of Sulphur; ſeven ſcruples of it laid on a red-hot Iron, weighed only four afterward. Its Infuſion precipitates not Solution of Silver; but is purple with Galls, *Sumach* and Green Tea, and a blackiſh Yellow with Tincture of Logwood; a muddy White, with Solution of Sublimate and Sugar of Lead. A Piece of the Shale here, pouder'd, and infuſed in Water, in a cloſe Veſſel ſome hours, turned Solution of Silver white; it inſtantly crudled and precipitated. With Solution of Sublimate and Sugar of

Lead, it was Pearl; a muddy white, with Oil of Tartar and Spirit of Hartſhorn; a light Purple, with Galls, after a few Hours ſtanding bluiſh Green, with Syrup of Violets, *&c.* The Water of the *Sulphur-Well* cloſe corked up in a Phial eighteen Hours, in four Hours became white, loſt nothing of its ſmell. This Phial ſet in a Pan of Water, till it was ſcalding-hot, had ſtill its former ſmell; put in again till the Water boil'd, it was ſtill the ſame, tho' it had thrown its Cork thrice, with prodigious Force and Crack. The Bottle ſtood an Hour and quarter in the Pan, till the Water in the laſt was almoſt exhal'd; then I took it out, and pour'd it on Solution of Silver; it became of a dark colour, like thick muddy Ale: It had a moſt abominable ſmell of an half rotten human Carcaſs, having loſt its natural Odour. The Salt of this Water laid on a red-hot Iron, crackles, but ſtinks not.

154. *Knaresburgh Sulphur Well* is of a dark blue Colour when taken up; but turns white, after ſeven or eight hours ſtanding; it ſmells and taſtes ſtrong of Sulphur, which it loſes by ſtanding nine hours in an open Veſſel. A Gallon of it exhaled, left ſix ſcruples of ſediment; which is to the Vehicle, as 1 to 512. Fourteen Pints of this ſediment was Earth. The Water, with Solution of Silver, is a dark, or muddy White; then lets fall a dark ſediment, like a Bit of thin Bladder. With Tincture of Rhubarb it's a deep rediſh Brown; with Solution of Sublimate, it's firſt a dark White, then bluiſh Clear white ſediment; near the ſame, with Sugar of Lead; Pearl, with Oil of Tartar; yellowiſh, with Spirit of *Sal Armoniac*; a deep Brown with Tincture of Logwood; yellow, with Tincture of Galls, *&c.* Its Salt was wholly Marine; its Cryſtals you have repreſented exactly.

155. *Bilton-Spaw* in the Park, is a ſtrong Sulphur, leaves a prodigious quantity of white Sludge in its ſtream. It turns Solution of Silver, firſt of a ſtrong Beer colour; then it turns white, and throws down much white ſediment. Galls alter'd it not; four Gallons of it exhal'd, left half an Ounce of ſediment; which is to the Vehicle, as 1 to 1024. This ſediment contained one ſixth of Earth; the Salt diſſolved, and ſet to cryſtallize, was alſo Marine only. This ſediment, when all the Water was exhal'd, ſmell'd ſtrong of Horſe-Parſley. There was alſo a very cold Well at *Harrigate*, famed for ſore Eyes. This, Dr. *Neal* of *Doncaſter* turned into a very good Cold Bath, with very good Conveniencies and Accommodations for Strangers. It makes the Spirits in the Thermometer ſubſide ſix eighths of an Inch

lower than in common Water, in *October* and *March*, when I tried it. There are alſo ſeveral ouzing Springs in a Marſhy Clay-Ground, below *Harrigate*, of a ſaltiſh Taſte: Theſe, upon Trial, afford only common Salt, without either Sulphur or Vitriol.

157. In my Return from *Whitby*, nine Miles on this ſide, and a Mile and half from *Saltergate*, we find *Newton Dale* petrifying, cold Spring. It's exceeding aſtringent, and a much rapider Stream than *Knaresburgh* dropping Well. It falls from the Mountains above, in a ſubterranean Current, diſcharges it ſelf here, petrifies every thing in its Courſe with various and beautiful Incruſtations and Figures (being truly coarſe Oſtcotole,) effectually cures Looſneſſes, or Hæmorrhages of any kind, in Man or Beaſt. It quickly and wonderfully reſtores weakned, and even beginning, diſtorted Joints and Limbs, by bathing in it.

158. Seven Miles from *Harrigate*, and two Miles from *Rippon*, is *Oldfield-Spaw*. It lies between two Hills, near an old Abbey, in a very Romantic ſituation, reſembling *Matlock*, within ſeven or eight Yards of a Brook-ſide, has been known about thirty ſix Years; it was diſcover'd, in digging the Ground-work of a Houſe: In digging, you firſt come to a blue Clay a Yard thick; then to a blue Shale two Yards thick; then to a Clay again a Yard and half thick; and laſtly, a ſandy Gravel: But none of theſe are the Impregnators of the Waters; theſe are ſtill out of Ken. A Quart or two of the Waters drunk haſtily, vomits; and four or five Quarts of it work off by Stool and Urine. The Spring is always of the ſame height, and is neither affected by Rain nor Drought; only it boils up impetuouſly with a great noiſe againſt Change of Weather; but throws forth no more Water. The Water poured into a Glaſs, riſes up in Rows like ſtrings of Beads; and beſits the Glaſs-ſides with Bubbles. It riſes up South-Eaſt, in a very hilly Country, dyes its Baſon rediſh, turns Oak-Leaves, Graſs, old Rags, &c. white. Twelve Pints of it boiled away, left thirteen ſcruples of browniſh white ſediment, brackiſh ſalt, crackled, and flew about on a red-hot Iron; precipitated Solution of Silver, fermented ſtrongly with Oil of Vitriol, and turned Syrup of Violets green. This ſediment left half a dram, or thirty grains of Earth, upon ſolution and filtration. The Salt was wholly Marine, without mixture. Thus, the Sediment, or fixt Parts in this, is to the Vehicle, as 1 to 365$\frac{7}{13}$. The Water, with Tincture of Nephritic Wood, was a yellowiſh Clear at top, and thick at bottom; a pale Yellow, with Tincture of Rhubarb; clear, and a white ſediment,

with Solution of Sublimate it was blackiſh, and precipitated a brown ſediment, with Solution of Sugar of Lead; clear at top, and white at bottom, with Oil of Tartar and Spirit of Hartſhorn. The acid Spirits affected it not; nor did Galls, Green Tea or *Sumach*.

159. The *Filah-Spaw* (about ſix Miles from *Scarburgh*) belongs properly to the Claſs of Purging Chalybeates: Yet becauſe of its great Quantity, and Genus of Salt, I have reſerved it to this Place. It lies half a Mile North of the Town, within ten Yards of the Top of a frightful Precipice, about 150 Yards high, which bounds the ſwelling Waves. It riſes up full Eaſt, throws out eight Gallons of Water in an hour. It is of a very ſalt Chalybeate Taſte, ſmells Inky, is covered all the Summer with a red ſcum. Its Baſon and Stream are full of Oker. It's a perennial unaltering Spring, being the ſame in all weather and ſeaſons. It's a whitiſh Water, and very full of the Mineral Spirit. It's not known when, or by whom it was diſcovered. The common People drink of it a Gallon in a Morning: It's a powerful Purgative and Diuretic. It inſtantly precipitates Solution of Silver; it's bluiſh with Solution of Copper, turns cloudy, and lets fall a blue ſediment; it's whitiſh at firſt with Tincture of Nephritic Wood; but next Morning it was of a deep Green, and crudled: With Tincture of Rhubarb, it was rediſh, or a rediſh Yellow; next Morning it was full of Clouds, and had precipitated: With Solution of Sublimate, whitiſh; with Solution of Sugar of Lead, firſt white, then let fall much white Pouder: With Oil of Tartar and Spirit of Hartſhorn, whitiſh, on mixing; the next Day both had much white ſediment. The acid Spirits fermented with it, and made it of a fine bluiſh Clear; green, with Syrup of Violets: Tinctures of Logwood, Galls and *Sumach* turned it of a beautiful Red; Brandy turned it purpliſh. Two Gallons of it exhaled, left four Ounces of ſediment, which inſtantly precipitated Solution of Silver; turned Syrup of Violets green; made a violent Ebullition with much ſmoak, with Oil of Vitriol; its Solution was green. This ſediment afforded two drams and ten grains of Earth; the reſt was all Salt; which, upon Cryſtallization, was wholly Marine Salt. The ſediment in this *Spaw* is to its Vehicle, as 1 to 67.

160. Upper *Normanby Sulphur Spaw* four Miles from *Pickering.* It's ſaid to purge gently. About 50 Years ago, it was a Bogg juſt on the Brink of the River: It riſes up in a Bank of Clay, about an hundred Yards Eaſt of the Village. Its Baſon and Stream are black as Coal; but Cloaths, Sticks, *&c.* fallen into it, white. The Water ſtinks intolerably; and by the help of a moderate Wind, may be ſmelt half a Mile off. The Water turns Jet black, thick, crudles, and lets fall a ſediment, with Solutions of Silver, Sublimate, Copper and Sugar of Lead: Oil of Tartar cauſes a little Precipitation; Galls alter it not: It's very red with Tincture of Logwood. It is the beautifulleſt, cleareſt Water I ever ſaw, ſparkles like *Champaigne* when poured out. The Spring affords the ſame quantity of Water Summer and Winter, about ſixty Gallons in an Hour, and is always covered with a blue ſcum. The River into which it diſcharges it ſelf, is ſtrangely loaded with Oker in all its Stream eſpecially about the *Middleton* and *Black Park Spaws.* Four Gallons of this Sulphur-Water exhaled, left two Drams of ſediment, of a greyiſh white Colour and pungent Taſte. But tho' the ingenious *Tho Robinſon,* Eſq; exhaled twice of it afterwards, we never had a ſixth part of the ſediment. It's very ſtrong of the Sulphur and Mineral Spirit, but weak of the fixt Parts, the laſt being to the Vehicle, as 1 to 2048. The *Lixivium* of its *Salt* ſet by to cryſtallize, affords about two Parts *Nitre,* and a third Part common *Salt.* Nether *Normanby Spaw* is a Chalybeate; a Gallon of it exhaled, left ten Grains of ſediment, which was brackiſh *Salt,* crackled, and flew about on a red-hot Iron; fermented ſtrongly with Spirit and Oil of Vitriol, inſtantly precipitated Solution of Silver, and turned Syrup of Violets green.

161. The next *Sulphur Water* of Note after *Harrigate,* is *Croft-Spaw,* within the Borders of *Yorkſhire* and on the Confines of the Biſhoprick of *Durham,* very near *Darkington.* This has merited a great Reputation, and is much frequented in the Seaſon, has done many very eminent Cures, both by Bathing and Drinking. It's in the Pariſh of *Croft,* about half a Mile from the Church, is in a charming ſituation, riſes up South-Eaſt, was firſt taken notice of, and brought into Fame by Sir *William* ——, in whoſe Lordſhip it laid. It's a fine clear ſparkling Water, ſmells ſtrong of *Sulphur,* nor does its Stream riſe or fall by Rain or Drought. The Place lies all upon Lime-ſtone; every thing in its Courſe becomes white with rediſh ſpecks between: It's drunk from Four Pints to Nine; it crudles Milk and Soap. It's a bluiſh White with Solution of Silver,

a fine bright Yellow, with Tincture of Rhubarb; whitiſh, with Solution of Sublimate; white, with Solution of Sugar of Lead; white, with Oil of Tartar and Spirit of Hartſhorn; Galls alter it not: It's a rediſh Yellow, with Tincture of Logwood. Nine Quarts of it exhaled, left twenty ſcruples of ſediment, very white, and ſmell'd ſtrong of Hawthorn-Flowers. This ſediment afforded ſix ſcruples of Salt: ſo that the Sediment is to the Vehicle, as 1 to 354 and a half. This Salt diſſolv'd, and ſet to cryſtallize, projected about two Parts Nitre, and a third Part common Salt. This Place deſerves greater Reſort, having done ſeveral great Cures, as well by Bathing as Drinking.

Broughton-Spaw, near the Houſe of —— *Tempeſt*, Eſq; It riſes out of the North ſide of a gentle Aſcent, under a Hedge, upon the Left-hand in the Road ſide from *Skipton* to *Coln* in *Lancaſhire*. It makes Leaves of Trees, Moſs, &c. red, and its Baſon and whole Courſe Raven-black: It makes Silver firſt like Copper, then black; Copper it turns preſently black. The Spring lays the Spirits in the Thermometer three Eighths of an Inch below common Water. It's of a whitiſh Colour. About ten Yards North-Weſt of this, on the other ſide of the High-way, is an ouzing Spring, which leaves much Oker on the Earth's ſurface. It's very clear, taſtes Vitriolic, ſmells Inky, and ſtrikes Purple with Galls, *Sumach* and Green Tea. Therefore, were there proper Care taken, here might be a Chalybeate. A Quart of the *Sulphur-Spaw* exhal'd, left a Dram of ſediment, fifteen Grains whereof was Earth. This Salt diſſolv'd, and ſet to cryſtallize, afforded very beautiful Cryſtals of Nitre above, and Marine Salt below; there was more of the laſt than the firſt. Here the Sediment is to the Vehicle, as 1 to 256. Theſe Experiments were made in *October*. In *July* following, I exhal'd again three Gallons of it, and there remained only ſeven Drams of ſediment, four ſcruples and a half whereof was Earth. A Phial Bottle fill'd a third part full of this Water, and ſet in the Pan of cold Water we were about to exhale, we took it out when the Water began to boil, poured ſome of it on ten Drops of Solution of Silver, it crudled, and was of a dark whitiſh Colour. The ſame it did when tried after the Water had boiled a conſiderable time; but upon a third Trial, the Mixture was perfectly white, all the *Sulphur* being exhal'd.

162. A little Mile from *Braughton*, is *Crickle-Spaw*, which riſes up about ſix Yards within a Hedge, at the bottom and Weſt ſide of a ſmall Hill, whoſe Perpendicular is not above ſeven or eight Yards, and at thirty Yards diſtance from a Moraſs. In Rainy Weather the

Spaw is fill'd up with freſh Water out of a Drein cloſe by it in the Meadow. It's a clear, fine, ſtrongly fetid Water; it turns Silver black in a Minute. Its Baſon and the Earth in its Courſe are ſhining black; Rags, Leaves, Graſs, &c. are very white in it. Below this *Spaw* is a ſmall River in the Meadow; from its bottom ſpring up a great many other ſtrong *Sulphur*-Waters, ſix or ſeven whereof I counted. They diſcover themſelves in the River, 1. From the exceeding Blackneſs of the Water. 2. From the white ſulphureous Matter they leave on Sticks, Straw, Graſs, &c. All theſe Springs crudle Soap and Milk. A Quart of this *Spaw* exhaled, left four ſcruples of ſediment, twelve grains whereof was Earth. The Salt diſſolved, and ſet to cryſtallize, was near one half Marine Salt, the reſt Nitre. A little South-Eaſt of this, in a ſmall Ditch, under a Ridge on the other ſide of the River, is a Chalybeate never known or noticed before, and wants only a Place making for a Receptacle. Half a Grain of Pouder of Galls ſtruck half a Pint of it a deep purple Colour inſtantly. This riſes North from the Foot of another little Hill, not twenty Yards from the River-ſide. The ſediment of this *Sulphur*-Well is to its Vehicle, as 1 to 192. Three Gallons of *Cricklee-Spaw* exhal'd in *July* following, left an Ounce of ſediment, three ſcruples and a half whereof was Earth.

163. *Skipton* Old *Sulphur*-Well neither crudles Soap nor Milk. Its Sulphur is little and volatile, being moſtly loſt between the *Spaw* and the Town, tho' the Bottles were cloſe corked: It made the Braſs Pan wherein it was exhaled, very blue above the Water. Three Pints of this Water exhaled, left half a dram of ſediment, nine whereof was Earth, the reſt Nitre. *Cricklee*, *Broughton* and *Skipton* New Sulphur-Wells compared, were thus, after they had ſtood all Night with the Mixtures in the Glaſſes: The firſt, with Solution of Silver, was firſt Ink-black, and roſe up in ſtrings of little Bubbles like Beads; then it crudled, was clear at top, and had a black Pellicle ſticking to the bottom and ſides of the Glaſs: The ſecond was the ſame, only yellow at top inſtead of clear: The third was very clear, only had a ſmall Wooll, like ſediment, at bottom. The ſame it was with Solution of Copper put to them; only the laſt was a ſky blue without ſediment. With Tincture of Nephritic Wood, the firſt and ſecond were of a dark Pearl, and very muddy; the third very bluiſh. With Tincture of Rhubarb, the firſt and ſecond were a deep Brown, with a yellowiſh Caſt, and muddy; the third, a deep browniſh Red and clear. With Solution of Sublimate, the firſt two were whitiſh,

had a Pellicle on their ſurface; and a pretty large ſediment at bottom; the laſt, a bluiſh White without ſediment. With Solution of Sugar of Lead, the firſt two were Ink-black, and let fall ſediments of the ſame colour, the third was clear; with Oil of Tartar, the two firſt black, with ſome ſediment. The third, a faint White. With Syrup of Violets, all three were greeniſh; with Tincture of Logwood, they were of a dark blackiſh Brown; with Tincture of Galls and *Sumach*, they were of a whitiſh Clay-colour.

164. *Wiggleſworth-Spaw*; in the Pariſh of *Long Preſton*, in the Eſtate of *Tho. Waddle*, Eſq; It has been uſed time out of mind. Rains and Drought make no Alteration on it. The Country-people drink four or five Pints of it to vomit them, and ſix or ſeven to purge them. The Water is very black, ſmells ſtrong of Sulphur, and has a very weak ſtream; bubbles not, but ſprings up, is always cover'd with a white ſcum; dyes Leaves, Graſs, Roots or Sticks white. It riſes out at the Foot of a Hill; it's upon the Greet-ſtone ſoil, and a little way off is Lime-ſtone. It taſtes ſalt, yet lathers with Soap, and crudles not Milk. A Phial-Glaſs third part full of the Water, well cork'd, and ty'd down, and ſet in the Water we were about to exhale, when it began to boil, we took it out, and poured ſome of the Water on Solution of Silver, which it turn'd black, and crudled. It was corked again, and ſet in the boiling Water, let it ſtand half an hour; Solution of Silver ſtill turn'd it black. It was corked up, and ſet in the boiling Water a third time for half an hour; then taken out and tried, but was not black as before, and cauſed little crudling. The laſt, however, ſtood all Night; the Precipitation was of a black Colour, the Water above was clear. The freſh Water, with Solution of Silver, is a browniſh Black, crudles, and lets fall a ſediment. It's black with Solution of Copper, Sugar of Lead and Oil of Tartar; it's a fine bright Yellow, with Tincture of Rhubarb; white at bottom, yellow in the middle, and clear at top, with Solution of Sublimate; it's a light Blue, with Syrup of Violets; a light Red, with Tincture of *Braſil*-Wood; a dark Red, with Tincture of Logwood; Clayie whitiſh, with Tincture of Galls, &c. Three Gallons and a half of it exhal'd, left ſeven Drams of ſediment, ſix ſcruples and a half whereof was black Earth, the reſt was a Salt *ſui generis*. A Nitre it is, but of what kind, I leave the Reader to judge, from the Figure of its Cryſtals.

165. *Ridmer-Spaw*, in the Pariſh of *Wenſley* in *Wenchdale*. It lies half a Mile from *Ridmer*, at the bottom of a Hill, cloſe by the River-ſide. It's a weak Stream, boils up perpetually, like a boiling Pot; is always at the ſame ſpeed, neither increaſes nor decreaſes by Rain nor Drought; makes its Baſon, and any thing that falls into it, white. The Earth, in its whole Courſe, is a ſhining Black. It's a clear Water, and has a Bath about two Yards from it. In making the Bath, they found a dead Man's Bones. Neither Memory nor Tradition tell when, or by whom this *Spaw* was firſt diſcover'd. The Water ſits very light on the Stomach, and goes off very quickly by Urine. It riſes out of a Gravel Four Yards thick; and under that, is a blue Clay three or four Fathoms thick. At a little diſtance from it, are many Lead-Mines; it taſtes not ſaltiſh. With Solution of Silver it is a dark Pearl; with Tincture of Nephritic Wood, yellow; with Solution of Sublimate, whitiſh; with Solution of Sugar of Lead, Milk-white; with Oil of Tartar and Spirit of Hartſhorn, a pale Yellow; with Syrup of Violets, bluiſh; with Tincture of *Braſil*-Wood, deep Red; with Tincture of Logwood, Crimſon-Red; with Tincture of Galls, whitiſh. It has done ſeveral notable Cures in the Rickets, Scurvy, Lameneſs, Rheumatiſm, *&c.* by drinking and bathing in it. Nine Quarts of it exhaled, left of ſediment Four Drams and a half; Earth One Dram, eight Grains.

166. There is a weak inconſiderable *Sulphur*-Water in the midſt of a ſmall Valley, about a Mile from *Leeds*, and half a Mile from *Woodhouſe-car*. It is much out of order, and is of little uſe at preſent, except when the Croppers have got an over-Doſe at Night, it takes off its Effects next Morning. Three half Pints of it afforded Four Grains of *Marine Salt*. But,

167. We meet with one of much greater Note, at *Askeron*, five Miles from *Doncaſter*, in *Campſel*-Pariſh, ſeven Miles from *Pontefract*. It is exceeding clear Water: It has a fine Stone-Baſon, and is encloſed by a round Walk. Its ſtream is full of white thick Sludge, which ropes like a Decoction of *Althæa*. It ſmells and taſtes very ſtrong of *Sulphur*: It crudles Soap and Milk, turns Silver black, Braſs, a blue Copper-Colour. It retained its *Sulphur*-ſmell to a third degree of Heat. It becomes muddy, and crudles in boiling. It is a very diuretic light Water. The Farmers find it of notable ſervice to them in curing chaffed Feet, Saddle-galling, Horſes or Oxen galled in the Yoke, or by Loading *&c.* mangy Dogs, ſcabb'd Horſes, *&c.* It has done ſome notable Cures in inveterate ſtrumous and other

Ulcers, Scab, Leproſy, &c. It's muddy white, with Solution of Silver; a clear ſky-Blue with Tincture of Verdigreaſe; light Yellow, with Tincture of Rhubarb: It's firſt white, then crudles, and lets fall a large browniſh ſediment, with Sugar of Lead; with Oil of Tartar and Spirit of Hartſhorn, it is whitiſh, crudles, and lets fall much ſediment. It makes a ſtrong Ebullition, with the acid Spirits; with Tincture of Logwood, a beautiful deep Red; with Tincture of Galls, a muddy White. Five Quarts of it exhal'd, left three Drams of white ſparkling ſediment, a Dram whereof was a fine Salt, which crackled on a hot Iron; turned Syrup of Violets green; fermented little with the acid Spirits, but ſtruck the Noſe with a pungent ſmell. The reſt of the Salt diſſolved, and ſet to cryſtallize, projected very fine Cryſtals of Nitre and Marine Salt; the laſt was the largeſt. The ſediment here, is to the Water, as 1 to 426$\frac{2}{3}$; the Earth to the Salt, as 2 to 1.

This *Spaw* is within a few Yards of *Askeron*-Pool-ſide, the Water whereof is very hard, crudles Soap into hard Flakes, yet bleeches exceeding fine, ſtinks in Summer, abounds with Pike, Perch &c. It has ſeveral profound Pits in it, the Depth whereof are not known. It is conſtantly ſupplied with Water from theſe Pits; never is leſs in the greateſt Drought, nor overflows in the greateſt Rain, except the Mill-Dam below is ſtopt up with Sludge and Graſs. The Soil on one ſide is all Lime-ſtone; on the other ſide, a white Clay half a Foot deep, and below that a very fine white Sand.

168. Near *Catcliff* three Miles from *Rotheram*, and the ſame Diſtance from *Sheffield*, is a very fine clear Spring which ſmells faintly of *Sulphur*. Galls alter it not; Tincture of Rhubarb makes it of a Golden Colour. It's firſt blue, then green, with Syrup of Violets; Oil of Tartar and Spirit of Hartſhorn ſcarce alter it; acid Spirits change it not; Tincture of Nephritic Wood cauſed a ſmall ſeparation. Three Gallons of it exhal'd, left five ſcruples of ſediment, Forty four Grains whereof was a white Earth. This ſediment is to its Vehicle, as 1 to 1843$\frac{1}{6}$.

169. *Shuttlewood-Spaw* on the Common, between *Bolſover* and *Romeley*, riſes up Weſtward, out of a whitiſh Clay and Free-ſtone; and not far off, are Iron-ſtone and Coal, and at a little diſtance, Lime-ſtone: But our Water is oblig'd to none of the three laſt for its Principles, being impregnated only with a little *Sulphur* and Marine *Salt*. Sixteen Pints of this Water exhal'd, left half an Ounce of very white ſediment, a 24th Part whereof was Earth. The ſediment of

this Water is to its Vehicle, as 1 to 512. The Salt diſſolved, and ſet to cryſtallize, was wholly Marine. However, this *Spaw* has been very ſucceſsful in curing pimpled Faces, Eruptions on the Skin, old Ulcers, Strangury; and by bathing in it, Lameneſs, Weakneſs of the Joynts. Scab, *&c.* It is now made very convenient, the charitably diſpos'd Mr *Ch. Baſſeldine* of *Clown* having put down a fine ſmall Baſon, encloſed the Spring, and made a Bath below, into which the Baſon empties it ſelf, at his own Expences. The Water crudles Soap in a Minute; the Pidgeons about come to drink of it.

170. A Mile from *Dranefield* is *Cawley-Sulphur-Well.* It is a very clear Water whilſt in the Baſon freſh; but when ſtagnant, and in its ſlow Courſe, is blackiſh, and yet it turns every extraneous Body both in its Baſon and Stream, very white. It is a pale bluiſh White with Solution of Silver; then leaves a purpliſh Incruſtation on the ſides and bottom of the Glaſs. It is firſt a muddy Clay colour with Tincture of Galls, then turns green throughout; a deep rediſh Brown with Tincture of Logwood. Three Pints and a half of it exhaled, left of a white, pungent, ſaline ſediment, ſeventeen Grains, Four whereof was Earth; the reſt, being cryſtallized, was Nitre only.

171. Near *Keddleſton*, the Seat of the Honourable Sir *Nathanael Curſon*, three Miles from *Derby*, in the middle of the Park, is the ſtrongeſt *Sulphur*-Water in *Derbyſhire*. It has a very good Baſon or Receptacle, a Foot and half wide, and two Foot long. At its ſide are Flags laid, three Foot wide, and five Foot long, with a ſmall Gutter in the middle for the Water to empty it ſelf into a very good Bath ſix Foot long, three Foot wide, and three Foot deep, paved at bottom, and walled with good ſmooth Free-ſtone, and Seats by the drinking Water for twelve or ſixteen People. The drinking Water is exceeding clear, but ſtinks intolerably; makes Silver preſently a black Copper-colour. The ſtagnant Water is blackiſh; it alters not with Solution of Gold; but turns a blackiſh Brown, crudles, and lets fall much ſediment with Solution of Silver; a white Clear, with Solution of Sublimate; a dark Clay-colour, crudles, and lets fall a large ſediment, with Solution of Sugar of Lead; blackiſh, and lets fall a black ſediment with Oil of Tartar; a deep Violet, with Syrup of Cloves; red, with Tinctures of *Braſil* and Logwood; a deep Sack-colour, with Tinctures of Galls and *Sumach*. In twenty four Hours its ſmell was quite gone, tho, the Bottle was well corked. This Water gives Cloaths waſhed in it, a rediſh Colour, as *Quarndon* gives them a black. Eight Pints of this Water exhaled, left two ſcru-

ples of ſediment, twenty one Grains whereof was a dark browniſh Earth, the reſt Salt: which diſſolv'd, and ſet to cryſtallize, was wholly Marine Salt. Here the Sediment is to the Vehicle, as 1 to 556. Hence its greateſt Virtue lies in its volatile Parts; and it has done many ſurpriſing Cures in Worms, Pains of the Stomach, old Ulcers, Eruptions on the Skin, King's Evil, Lameneſs, Swellings, Weakneſs of the Joynts, fix'd and wandring Pains, &c by drinking, and bathing in it.

172. *Wirkſworth* black Sulphur-Water is famous, not only for Cutaneous Diſorders, but alſo for Rheums of the Eyes, and ſcrophulous Diſorders thereof. It is the weakeſt of all the Sulphur-ſprings I have ſeen; lies at the South End of the Town, near the Warm Brook, within a Stone Fence, on the Right Hand from this to *Derby*. Its Water is very black: The Soil is firſt Corn-Mould, then Shale and Earth mixt; 3. Shale; 4. Shale and Spar mixt. About an hundred Yards higher is a Vein of *Brazil* (which is chiefly Marcaſite of Sulphur) three Yards and half broad, and very thick, lying in Shale, as its Mother. Theſe two produce this Spring, which alters not Solution of Gold; is a bluiſh Clear, with Solution of Silver; has a variegated ſcum at top, white, and a white Pouder at bottom, with Solution of Sublimate; whitiſh Clear, with a rediſh Duſt incruſtated on the Glaſs with Solution of Sugar of Lead; very clear, with a grey Pouder, with Oil of Tartar; ſlight Purple, with Tincture of Logwood; a deep Blue, with a Cruſt on the Glaſs-ſides of the ſame Colour, with Tincture of Galls; a deep opaque Blue, with Green Tea. Twelve Pints of this Water exhaled, left ſixty Grains of ſediment, thirty four whereof was black Earth; the reſt diſſolved, and ſet to cryſtallize, projected Cryſtals of fine Nitre only. This is the firſt Sulphur-Water we have met with that contains a Load of Vitriol, with its other Ingredients. This ſediment is to the Water, as 1 to 1536. It is alſo the only Sulphur-Water which contains pure Nitre only.

Theſe are all the Sulphur-Waters in *Derbyſhire* which I have heard of. I met with none in *Lincolnſhire*, and *Nottinghamſhire*, and theſe mentioned, are only a few of thoſe in *Yorkſhire*: The reſt, as they ſeem of ſmaller Note, becauſe perhaps leſs known, we have not yet had an Opportunity to examine, and therefore ſhall ſuſpend our Informations of them at preſent.

175. Come we next to a Water of a very different kind, *viz. Kinalton-Spaw* in *Nottinghamſhire.* It lies in a ſmall Cloſe, on the Right Hand, at the Weſt End of this long Village. It is a clear, pleaſant, cooling, ſaltiſh-taſted Water, with a weak Stream. With Solution of Silver it's firſt blackiſh, then white, and preſently lets fall a ſmall white ſediment. Tinctures of Verdigreaſe and Nephritic Wood, Solution of Sublimate, and the acid Spirits alter'd not. It is very white and thick with Solution of Sugar of Lead; it's white, crudles preſently, and lets fall much white ſediment, with Oil of Tartar and Spirit of Hartſhorn; it is a beautiful light Red, with Tincture of Logwood. I could diſcover nothing of the Chalybeate in it, when brought to me at *Screaton*; whether it has at the Spring-head, or not, I cannot tell. Eighteen Pints of it exhal'd, left near an Ounce of beautiful white ſediment, ſix ſcruples and a half whereof was a moſt alcaline white Earth; the reſt Salt, which diſſolved, and ſet to cryſtallize, was the pureſt, cleaneſt Nitre of any I had before met with. This ſediment is to the Water, as 1 to 288. Hence it purges when drank plentifully.

176. *Ichley-Spaw* ſprings out of the middle of a Mountain, a Mile high, and conſiſts chiefly of Lime ſtone and Free-ſtone. The Water is very clear, briſk and ſparkling; has no taſte, colour nor ſmell different from the common Water, is of the ſame weight. Its Baſon and Courſe are of no other Dye than that of a common Spring. About thirty five Years ago, there were a Houſe and a Bath built, about a Furlong below the original Spring, which Spring was brought down in Stone-Pipes. The firſt Spring, near the top of the Hill was very weak and ſmall; this, very large and ſtrong; whereby there appears to be a large Mixture of other Springs with this: ſince which time, it has fallen much ſhort of its former great ſucceſs. Twenty Yards above the drinking Well (over which is built a ſmall Houſe of a Yard ſquare on the inſide) they have cut thro' an original Spring of common Water. There are ſeveral old Lime-Kilns a little above this. The Water is firſt whitiſh, then blackiſh Purple, with Solution of Silver; it's very clear, and has a purpliſh Pellicle, with Solution of Sublimate; it was firſt white, then clear in the middle, and a white Mucus at the ſides and bottom of the Glaſs, with Solution of Sugar of Lead; very clear, with Oil of Tartar; whitiſh, with Spirit of Hartſhorn; and the ſame as common Water, with all the other Tryals. Five Pints of this Liquor exhaled left

ſeven Grains of ſediment, the Salt whereof diſſolved in diſtilled Water, turned Solution of Silver purple; was white with Spirit of Hartſhorn: Therefore tho' this Water is of the greateſt Eſteem and Repute of any in the North of *England*, in the King's Evil and other old Ulcers; yet it derives theſe Effects neither from its fixt nor volatile Parts; but wholly from the Coldneſs and Purity of the Element, its drying nature from the Lime-ſtone it waſhes, tho' a great part of it comes from blue Clay.

175. From the whole Water of this Claſs, obſerve we, 1. That ſince they are ſo very clear when taken up, but in a few hours become white and muddy; and when carried or kept, are of a more diſagreeable Taſte, nauſeous to the Stomach of the Drinker, are ſlower of Digeſtion and Diſcharge, produce worſe ſymptoms, anſwer not the ſame end, nor have the ſame good Effects, are heavier, leſs briſk, invigorate not the Body; 'tis plain, I ſay, from all thoſe Alterations and Differences between the Water drank freſh at the Spring, and when carried at a diſtance, or kept, that this Claſs alſo contains a Mineral Spirit, which, in common with other Spirits, has a very great Volatility, and diſpoſition to fly off, as is incapable of being preſerved or retained by ſuch Veſſels as keep other Spirits of the ſubtileſt ſort, as of Hartſhorn, *Sal Armoniac*, &c. Wherefore the Particles of thoſe Spirits (tho' conſiſting of Matter) muſt be ſmaller than the Pores of the Glaſs, and ſmaller than thoſe of *Sal Armoniac*; and thereby upon Agitation or Motion, or on its Aſcenſion in the Water, and mixing with the little included Air, it makes its eſcape. The Air being Elaſtic, this Mineral Spirit muſt be the ſame: For being waſh'd off from the Minerals in the *ſtrata* of Earth by the Water, it's wrapp'd up in the Particles of Air, is mixt and ſuſpended with it in the Element, ſo as either upon the Motion, or Diminution of the Air, they get diſentangl'd and ſet at liberty; its Mineral being the ſlighteſt Parts of ſuch Minerals, Metals, or Foſſils, as are diſſolvable in Water: Therefore tho' a material ſubſtance, yet very different from the Air; yea, as different as the Vehicle which brings it.

I take not this Spirit to be a Portion of the univerſal Spirit, which has its principal ſeat in Sulphur: For beſides the Laxneſs, Indefiniteneſs, and Inſignificancy of the Expreſſion, were there any thing in it, ſuch Minerals and Foſſils as abound moſt with Sulphur (wherein this Spirit is chiefly ſaid to reſide, and keep Court) ſhould certainly be moſt ſpirituous, and eſpecially Sulphur-Waters; which holds not always: For we often find Chalybeates more ſpirituous than ſeveral Sulphur-phur-Waters: But this Spirit we look upon to be only the minuted, diſſolv'd, or abraded, ſeparable, looſe Particles of Minerals, Metals and Foſſils, together with their proper included Air, ſo exceeding ſmall, that they are lighter than the common Water, which waſhes or rubs them off; and if we know the diſſolvable Minerals any Water waſhes, we alſo know what this Spirit is, tho' not, perhaps, the exact Parts of its Compoſition, where there happen to be ſeveral diſſolvable ſubſtances in the road at once. The Quantity of this Spirit impregnating theſe Waters, will be, 1. According to the Plenty, Diſſolubility, and Separability of the Materials in the Water's Courſe. 2. According to the more intenſe or remiſs Ebullition or Action of thoſe Parts between themſelves on their Mixture, or on the Water. 3. According to the Diſpoſition of the Water, whether it be hard or ſoft; whether its Interſtices be previouſly loaded with other Materials of Earth, Stone, Salts, *&c.* whether the Materials previouſly in the Water tend to encourage or check the Action of the diſſolvable and commiſcible Materials upon one another. Some, to make the thing more plauſible, and go better down, tell us, that theſe Minerals are only *in fieri*, or Embryo, and ſo mix with the Waters: but this is a Jeſt. Are theſe Minerals ſtill to be in a fluid ſtate, and never arrive at a fixt or ſolid form? The *Bath*-Waters have been known and uſed above two thouſand Years: They are as richly impregnated now as then, are as efficacious in their Operation as ever, and have all their impregnating Minerals run all this while in a liquid form? If ſo, ſure, they will never be fixt. Again, ſuppoſing them in a ſtate of Fluidity, is Water by any means a ſuitable Vehicle for them to mix with, and be ſupported by? Will not their ſuperior Gravity, not to add, their attractive Force, cauſe them quickly to ſubſide, and ſeparate from the Vehicle? We ſee Chalybeate Waters depoſit their Oker, and will ſtrike no longer with Galls. Nor will Water ſupport Metals diſſolved in *Aqua fortis*. Others object, that if Mineral Waters were impregnated by a Diſſolution and Mixture of ſome part of the Minerals; were the ſubterranean Cavities never ſo well ſtored with theſe Minerals, they would in time be wholly waſh'd away and ſpent. But this is only trifling: For how inconceivably ſmall a quantity of the Mineral Subſtance is requiſite to impregnate a great quantity of Water, is viſible to ſuch as have tried how few Grains of Vitriol diſſolved in a Pipe of Water, will ſtrike Purple with Galls; or how ſmall a Piece of Allum-ſtone half burnt, or of *Bitumen* made diſſolvable, will make a great deal of the moſt ſtinking Water, we know. Let us remember again, that ſeveral Springs prodigiouſly loaded with their impregnating Ingredients, have continu'd Ages beyond our Hiſtories and Memories, and are as highly ſaturated with their Ingredients now, as when firſt known; as *Bath*, *Harrigate*, *Scarburgh*, &c. Indeed, if the Minerals are ſcanty, the Stream that waſhes them, ſtrong, they may in time weaken, if not wear out. Some few Accounts we have of ſuch in Hiſtory; but know not whether Superſtition, the Element it ſelf, or impregnating Minerals gave them thoſe Virtues; but the firſt two are the more likely.

Indeed, if Mineral Waters, by ſome Accident take another undiſcover'd Courſe, and common Water riſe up in the ſame Springs, they may be ſaid to be loſt to us; becauſe they are gone, but in reality continue, tho' in another Channel. A Spirit of ſuch a penetrating, ethereal, ſubtil, agile nature, muſt produce very ſurpriſing Effects, and be moſt prevalent in curing the moſt ſtubborn and obſtinate Diſtempers, by mixing with the Blood, finding a ready Paſſage into the ſmalleſt Veſſels, whether glandular or lymphatic, clearing off extraneous, obſtructing or mucous Matter, diſſolving and rarefying thick, grumous, ſtiff Humours, whether from the ſlowneſs of the Blood's Motion, the Languidneſs of its Veſſels, or their Diſtention; or from too large ſecretions and diſcharge of the fluider Parts, or a Retention of what ought to be diſcharged. Hence, the whole Maſs is rarefied, the uſeleſs or hurtful Parts clear'd off, and the uſeful made more ſo; the whole Body is warmed and ſtrengthen'd, the flagged Pulſe rais'd, the faded Complexion reſtor'd, languiſhing Nature invigorated, and a kind of new Life is inſpir'd.

The next Principle in theſe Waters is Sulphur, diſcoverable from their Smell, Taſte, the different Colours of Black, blackiſh Brown, Brown, &c. Theſe Waters afford, with Metallic Solutions, their turning Silver a Copper-colour, or black, their diſcolouring white Metals, their white Scum and black Sludge, which ſmoke and give a blue Flame; and finally, the ſublimed Flowers of Sulphur found under ſome of their Baſons. 3. From the different Colours theſe Waters give with metallic Solutions, from the intenſeneſs or remiſneſs of their differently diſcolouring white Metals, &c. we find, ſome of 'em contain more, others leſs of the Sulphur. 4. Since ſome afford precipitated Sulphur, others not; ſome ſend Sulphur over the Helm by Diſtillation, but the greateſt Part not; ſome retaining their Smell to the ſecond, third, fourth degree of Heat, and ſome even till they have boil'd a conſiderable time; ſome retaining their Sulphur eight or nine Months, and would have done longer; others, not a Day, with the ſame Care, *&c.* We find, there is a great difference, not only in the ſundry Proportions, but even in the ſundry Degrees of Volatility of this Sulphur. 5. From the different Proportions of their contain'd Sulphur, and other Principles, even in weaker Springs, it is plain, the Veins or Body of impregnating Minerals are either not alike rich, or equally diſpos'd for Diſſolution in the ſame time. 6. As Sulphur is the common Ingredient of them all, and intitle them to this Claſs; its Effects upon Animal Bodies are heating, drying, reſolving, diſcuſſing, opening, inciding; it mollifies, heals, digeſts reſiſts Putrefaction, *&c.* As to the tractable, or fixt Parts in thoſe Waters, they are,

Firſt, Salt, and that chiefly Marine or Nitre: The firſt call'd by *Hoffman*, Common Salt, and a fixt Alcaline Salt; the laſt is Dr. *Liſter*'s Lime-ſtone-Salt Now, ſince *Harrigate* three Sulphur-Wells, *Knaresburgh* and *Bilton-Spaws*, *Oldfield*, *Keddleſton*, *Shuttlewood*, *New Clopton*, *Filah*, *Burlington* and *Skipron* Old Sulphur-Well, afford only one Salt, which preſerves and brightens the Colour of Syrup of Cloves, turns Syrup of Violets a beautiful Green, inſtantly precipitates Solution of Silver, crackles and flies on a red-hot Iron, ferments ſtrongly, and ſmokes with Oil and Spirits of Vitriol and Sulphur, emits an urinous ſmell with *Sal Armoniac*, and ſhoots into Grains of a Cubical Figure on Cryſtalization, or Hexagons like Dees; we ſay, theſe contain marine, or common Salt, and that only. Tho' we have obſerv'd three ſorts of it; firſt, ſuch as upon Cryſtalization, had the upper ſides of its Cryſtals divided into four Triangles, the Angles of two whereof oppoſite to the Hypotenuſe were obtuſe, and the Angles oppoſite to the Hypotenuſe of the other two were acute, as repreſented in the Figure of *Knaresburgh*-Salts, which, of all others, were the moſt remarkable for this. 2. The Salt of many of the other Springs afforded Cryſtals, the ſame in all reſpects with thoſe of Sea-Salt. 3. The Salts of ſome of theſe Springs laid on a red-hot Iron, ſtunk as intolerably as Pouder of Roll Brimſtone, ſmok'd and flam'd; others neither ſtunk nor ſmok'd. The moſt remarkable of the firſt ſort, were thoſe of *Broughton* and *Crickle*. Since then all the Characteriſticks of *Hoffman*'s Fixt Alcaline Salt in Minerals are common to Marine-Salt; and ſince Salts which have all the Marks of his Alcaline

line Salt do cryſtalize into a Cubic Figure, we ſay, that this Fixt Alcaline Salt is purely Marine ; and Marine is his Fixt Alcaline Salt, which he could not poſſibly have been miſtaken or deceiv'd in, had he ſeparated it from its Earth, and cryſtalliz'd it.

The ſecond Salt is Nitre. We ſay, ſince ſeveral of thoſe Waters turn Tincture of Rhubarb of a rediſh Brown, precipitate with Oil of Tartar and Spirit of Hartſhorn, excite not Thirſt or Heat in the Drinkers, afford Cryſtals long and ſlender, with ſix unequal ſides in the middle, with Points conſiſting of two plain triangular ſides ; therefore they contain Nitre, but Sea-Water, *Harrigate, Crickle* and *Broughton-Spaws* turning it white with Oil of Tartar and Spirits of Hartſhorn and *Sal Armoniac* (which Sea-Salt diſſolved in diſtilled Water does not, as we have Certainty from many Experiments ;) we ſay, theſe Waters do alſo contain a Nitre, which flies off in Exhalation, and leaves only a fixt Marine Salt ; which diſſolved in diſtilled Water, gives no further Muddineſs, Whiteneſs or Precipitation with Oil of Tartar and the Alcaline Spirits. Nitre is very cooling, diuretic, purging, quenches Thirſt, abates the Heat of Inflammations, and inflammatory Fevers, incides and attenuates groſs Humours diſſolves grumous, thick and coagulated Blood or Humours, mitigates Pain, &c. We ſee again, that the Co-exiſtence of Sulphur is not inconſiſtent with any of thoſe Salts, ſince *Wirkſworth* Sulphur Water is as highly impregnated with Vitriol as Sulphur ; the firſt from the Shale, the laſt from thoſe ſulphurous Marcaſites, called the Miners *Braſil*.

We ſee, it is common to all ſtrong Sulphur Waters, and to them only, to turn the Earth and Sludge in their Courſe black, and all other extraneous Bodies white ; ſince they afford fixt Sulphur both naturally in Flowers, in their ſubterranean Chinks and Crevices, and under their Baſons, as alſo in their Scum and Sludge ; and alſo artificially, by Precipitation : Then they contain real Sulphur, not a meer *Halitus*, Blaſt or Stream ; and that they acquire not their fetid ſcent and taſte by ſtagnation, as Dr. *Liſter* will have it, eſpecially ſince ſome of them carry ſuch a prodigious Load of Salt, both Marine and Nitre, as is ſufficient to preſerve them a long time from Putrefaction, even in a ſtagnant ſtate ; others of them again have a plentiful Current, as *Knaresburgh Sulphur* Well ; ſome of them alſo upon keeping till they have loſt their natural ſmell, become freſh, and then putrid, have a ſtench very different from their former, *viz.* like rotten Carrion, as *Harrigate* and *Wiggleſworth*, which I have tried carefully.

Since none of all thoſe Waters (one only excepted) have any Appearance of Vitriol in them, whether fix'd or volatile, we have no reaſon to aſcribe the Cauſe of thoſe Waters to the Solution of a *Pyritis*, which is ſaid to conſiſt of Vitriol as well as Sulphur: And if the laſt is diſſolved, I cannot ſee how the firſt ſhould eſcape: But inſtead of Vitriol, we have often Marine Salt only, and ſometimes that mix'd with Nitre.

Again, corrupted Waters by Stagnation only, will not put a total ſtop to Fermentation, as theſe do: But this being peculiar to *Sulphur* only, therefore they contain *Sulphur*. Nor will ſtinking Waters from Stagnation formerly, produce the like Effects in Diſorders of Animal Bodies, either inwardly or outwardly; therefore we ſay, they contain *Sulphur*.

From our Tryals on the Minerals in and about the Allum-Well Bogg, we ſee, they afford only Vitriol and *Sulphur*: But neither Marine Salt, Nitre nor Allum as has been falſely reported and believ'd. From repeated Tryals here and elſewhere, we find, that a great many ſorts of it contain Vitriol ſufficient to impregnate Mineral Waters with this volatile Principle of themſelves.

It is alſo plain, from the Sediment theſe Waters let fall, on long keeping, or with Solution of Sugar of Lead, or by Exhalation, or Diſtillation, that they contain an Earth, which is as different as the ſundry ſorts through which theſe Waters paſs; but are chiefly of the Clayie, Stony, Chalky, and Calcarious kinds; which, as I ſaid before, are by no means hurtful, but uſeful in the Waters, being equal to the beſt of the Teſtaceous Tribe, in blending, ſmoothing and abſorbing thoſe ſharp Humours in the Blood, whether acid or acrid.

The greater Coldneſs in thoſe briny Waters, is the Effect of their Saltneſs. And, obſerve we here alſo, that all thoſe Waters purge in proportion to the Quantity of their contained Salt: Therefore *Harrigate*, *Crofts*, *Wiggleſworth*, *Crickle* and *Broughton*, are the chief Evacuants of this Tribe.

Since therefore *Harrigate*, *Crickle*, *Broughton*, *Croft*, *Normanby*, &c. are ſo plentifully ſtored and impregnated with *Sulphur*, of what eximious Force and Virtue muſt they be in removing and remedying outward Diſorders; how powerful Diſcuſſers of morbific Humours fix'd in any of the extreme or external Parts? From this healing, drying, diſcuſſing penetrating Principle it is, that they cure Swellings, Aches, Pains, Numbneſs, Ulcers, ſcrophulous or other Scab, Itch, Leproſie, Tetters, Ringworms, creeping, ſpreading and inflam'd Excoriations, by waſhing, bathing and fomenting, *&c.* And ſince the ſame Waters, *viz. Harrigate*, are loaded with Marine Salt, then their principal Intentions are Dilution, Calefaction, Stimulation, Penetration, Invigoration and Eradication. Hence Nature ſeems to have conferred this Gift upon thoſe *European* Blands, as the derniere Reſort in all Relaxations of the Veſſels, Nerves or Solids, in their great Inability and Indiſpoſition to Motion, in groſs Habits, corpulent Bodies, and phlegmatic Conſtitutions eſpecially; or ſuch as ſeem drown d in a Deluge of Water, or have their ſecretory Ducts plugg'd up by groſs ſizey Humours, weak and inelaſtic Veſſels.

Hence they challenge the Preference of all the Mineral Waters in the North, in Cachexy, Cacochimy, Dropſy, Jaundice, Palſy, Worms, Inappetency, and Indigeſtion, Chronic Agues, Quartans eſpecially, hard, ſwell'd and diſtended *Viſcera*, frequent Abortions, from a ſlipperineſs and Laxneſs of the *Uterus* and its Ligatures, beginning Dropſies of the *Ovaria* or *Uterus*, ſwell'd Legs, Swellings or Ulcers after the Small Pox, Meaſles or Fevers, Diſorders from Surfeits, ſtuffings of the Breaſt and Lungs from groſs tough Humours, fat or watery Collutions, if not extravaſated. Hence, ſuch as have been in eminent danger from vomiting or ſpitting of Blood from a loading of the Pulmonary Veſſels, and their Inactivity, have rarely, if ever, fail'd of Relief here: Nay, what really ſeems a Paradox, meagre, thin, conſumptive Bodies, have been cured of the Hæmorrhages here; inſtance the late Dr. *Preſcod* of *York*, and his Nephew, and the preſent Hoſtler at the *Queen's Head*, *Harrigate*, who was cured here in the Nineteenth Year of his Age, when his Lungs were alſo ulcerated.

But theſe Caſes I mark as accidental, not for Imitation: Tho' nothing was more ordinary for Dr. *Preſcod*, than to ſend ſuch Patients hither; nor can I find one Tragical Inſtance from it. In Scorbutic, Rheumatic and Dropſical Caſes, which require the ſubtile, volatile, and pungent Antiſcorbuticks to thin a ſizey Blood and Juices, and make them fitter for Circulation and Secretion; or to rouze up, ſet, and keep on Action, the dull, ſluggiſh, inactive, reſty Solids and Veſſels, ſure a better Water is not, as no Medicine in the World comes up to it.

Scarburgh, on the other hand, is juſt the Reverſe to it; its Nitre cooling the Blood and Juices in Choleric, Fiery, Active, Lean Habits, and ſuch as are parched up with hot aduſt Humours; whilſt its Earth blunts and ſheaths the ſharp irritating Particles of the Blood, and prevents their doing miſchief. Hence from repeated Obſervations, I declare, it is the only Remedy we have, that truly deſerves the Name of a Specific in Hectic Fevers. It not only does all, but inexpreſſibly more therein, than the Teſtaceous Pouders, cooling, ſoftening Emulſions, ſalt acid Droughts, the *Peruvian* Bark, Bitters and Viper-Broth, eſpecially when its Chalybeate Principle is gone, and drank to ſuch a quantity as ſhall not purge; laying aſide all other Medicines at the ſame time, except Aſſes Milk.

As theſe are the principal Deſigns of *Harrigate* Sulphur-Waters, ſo they anſwer a great many other; as, in the Gout, Cholic, Arthritic Pains, &c.

Dr. *Dean* and Dr *French* having been ſo full and plain in their Directions on the Uſe of thoſe Waters, there can very little be added; only I would adviſe a ſmaller Doſe, as three or four half Pints; and no Drinking in the Afternoon: And except there be ſomething in the Conſtitution or Diſtemper to forbid it, as an intenſe Hectic, ſome inward Inflammation, a quick and ſharp Pulſe, &c I would uſher in every Day's Doſe of the Chalybeate by one, two, or three Glaſſes of this; which has alſo this Advantage, that it is its own Preparative, needs no Vomiting or Purging to uſher in its Uſe. Nor would I have Ale drunk to Diet, but Claret, or Red *Port*-Wine and Water.

Croft, *Crickle* and *Broughton*, which have leſs Salt, and a Mixture of Nitre, are therefore leſs healing, drying and ſtimulating; but more cooling, attenuating and diluting; and therefore better adapted to choleric, fixt lean Bodies; ſuch as have a quick, ſharp, ſmall Pulſe, and Hectically diſpoſed: But of all thoſe, *Croft*-Spaw, as it contains moſt Nitre, is the beſt; theſe alſo anſwer the Intents of Sulphur, according to the Proportion they contain of it; which is diſcoverable from the foregoing Marks, and alſo the Deſign of Salt, according to their ſundry Quantities, which there is no occaſion to repeat, nor to ſet or preſcribe other Rules than for the laſt; only as the former were more irritating, heating, drying and evacuating, they may be uſed with greater Freedom by Paralitic, Dropſical, Icteric, and Phlegmatic Bodies; and the laſt more freely, by Choleric, thin, hectically-diſpos'd Perſons.

Thus I have remov'd ſome Rubbiſh, begun and finiſh'd ſome Outworks about theſe Waters, upon more ſolid Grounds, and conſonant to Truth, than has been by all thoſe wrangling Diſputes and ſiniſter Methods uſed before. But there are a great many *Deſiderata*, *Explicanda* and *Addenda*, together with an eaſie and certain Method of quickly diſcovering the impregnating Principles of Mineral Waters, and the Time and Manner of expeditiouſly procuring perfect Cryſtals from the Salts of any Water; though a late Writer confidently aſſerts, that there are a great many Waters, whoſe Salts will not Cryſtalize; and a great many things, whoſe Diſcovery have been hitherto reckon'd impoſſible, I could have produced: But having already gone as far as Bounds and Time will allow me, I ſhall leave theſe to be ſearched out afreſh by ſuch as ſhall be thought worthy of better Encouragement, to enable them to deſtine more time to this Work.

As I had only Truth, and the Welfare of Human Society at heart, in entering upon, and thus far proſecuting this Work; ſo if any ſhall think proper to challenge me with Miſtakes, I declare my ſelf an Enemy to Bigotry, and have a ready Ear to hear, and Mind to receive Conviction: But let none from ſiniſter Views, think to draw me into a Controverſie, or imagine that I am obliged to anſwer trifling Queries or Objections; for they will find me mute.

Appendix

APPENDIX.

Having had frequent Occaſion to mention Drams, Punch, Cyder, &c. *in the foregoing Rules for the Uſe of our Waters, I have here given the Advantages and Diſadvantages, Uſe and Abuſe of thoſe Liquors, as explanatory Notes on* p. 5. l. 19. p. 69. l. 10. p. 91. l. 27, 28, 38. p. 179. l. 39, *&c. having formerly wrote Diſſertations on common Water, Ale, and Tea, but had Occaſion to ſay nothing on theſe others.*

ALTHO' neither *Engliſh* Malt nor Moloſſos Spirits come up to the goodneſs of Brandy, yet the Fault is not in the Grain or Fruit from which they are extracted or made, but from the different Manner of their Preparation, Preſervation, or Fermentation, for both Grape and Grain conſiſt of, and afford the like Principles, *viz.* Oil, Salt, Flegm, and Earth, only they differ as to the Quantity and Connection of thoſe Principles; for the Grain has them more cloſely and firmly united; hence the Neceſſity of a double Fermentation to ſwell the compact earthy Parts, make them more ſpongy and porous, and ſo diſengage, break, and ſubtilize the oily and ſaline Parts that they may be ſeparated and extracted from the more groſs and earthy. Theſe Spirits differ alſo in reſpect of their Separability, Rarefaction, and Volatility; thus ſome Wines that are ſtronger bodied, abound more with Sulphur and Salt, afford leſs Spirit, than others that are thinner and appear weaker; for the ſpirituous Particles of the laſt are much ſmaller, lighter, and finer, and are leſs entangled in a Viſcus; *i. e.* their Spirits are more diſpoſed to Motion, riſe more readily and fully off the Earth and Flegm wherewith they were mixed.

Spirits of the Grape or Grain are the whole Oil or Salt of theſe Vegetables, broken and reduced into fine ſubtile and volatile Particles, ſmaller and lighter than the Flegm wherewith they are mixed. Theſe Spirits are neither acid nor alcaline, but of an indifferent Nature as to both, which *Boerhauve* has ſufficiently proved by ſeveral Experiments.

That there is no other Difference betwixt Brandy, Moloſſos, and Malt Spirits, let us take a View of the chimical Principles which each contain, and wherewith they abound; for all Spirits being obtained by Diſtillation, it's impoſſible the Fire ſhould make ſo great a Difference as is generally believed. Wine diſtilled yield much Spirit, which is only its Oil and Salts ſubtilized. Proceed you Diſtilling, after this Spirit you have much Flegm; after that come over acid Spirits mixed with a ſharp, white, nauſeous, aſtringent Flegm; continue the Diſtillation on and there riſes a black, thick, burnt, ſtinking Oil, which may be ſeparated from the acid Spirits by brown Paper; after all in the Bottom of the Still remains a Maſs of Salt and Earth, which may be ſeparated with Water: This Salt is a true, fixed, vegetable, alcaline Salt. Diſtill Ale or Beer, an inflammable Spirit riſes firſt, then after it a white, ſharp, aſtringent, nauſeous taſted Flegm, mixed with an acid Spirit; encreaſe the Fire more, and you raiſe a burnt, thick, black, ſtinking Oil, which may alſo be ſeparated from the acid Spirits by brown Paper, the acid Spirit is only the acid Salt diſſolved in the Flegm. After all you have in the Bottom of the Veſſel a Maſs like to black Pitch, which is only Earth and a fixed vegetable alcaline Salt. Moloſſos fermented with Water and caſt into a Still yield the ſame. Grapes contain much Oil, Salt, and a great deal of Flegm. Barley has very much Oil, and but a little eſſential Salt. Sugar has in it much eſſential Salt, and not a little Oil. As all theſe Spirits are in daily Uſe with us, I ſhall conſider their Uſe and Effects promiſcuouſly. For as the better Sort uſe only what's called Brandy, ſo the poorer muſt be content with Malt Spirits, which are cheaper, and whoſe Faults are, 1. Want of Age, which gives it an intolerable empyreumatic and fiery Taſte, tho' ſome pretend to take it off by putting into it dulcified Spirit of Nitre. 2. It's of a lower Standard than true *French* Brandy, for this has about ſeven Parts of Flegm to nine of Spirits, that has nine Parts Flegm to leſs than five of Spirits, and very often much leſs; for I cauſed twenty Quarts of it to be caſt into a Still, and we only got two Quarts of Spirit which would all burn away; *i. e.* nine Parts Flegm to one of Spirit. 3. It wants that delicious vinous Flavour of true Brandy; this ſome attempt to give by putting dulcified Spirit of Nitre, or young Budds of black Curran Berries into it, but the remarkable Taſte of the firſt, and the abominable califìed Flavour of the ſecond, diſcover the Cheat.

Good Brandy is clear (its yellowiſh, browniſh, or other Colours, if not fictitious are borrowed from the Caſk, wherein it has ſtood long; others tincture it with Moloſſos, Saffron, or other Ingredients, but the Deceit is detected by its fiery Taſte) not too hot, nor ſharp, of a pleaſant vinous ſmell, of a ſtrong Body, good Age, and eaſily fired. The beſt way to diſcover Brandy from Spirits, is, not to taſte it, but to pour a little of it into the Hollow of the Hand, and rub it between the Hands, then ſmell it, and if it have a flagrant vinous ſmell at firſt, and retain it a conſiderable Time, it's good; but if it ſtrike the olfactory Nerves at firſt with a ſtrong, hot, pungent Smell, then with a ſouriſh Smell like Water that has ſtood upon Meal till it ſour; and laſtly, if that Smell be ſucceeded by a faint one, it's plain you are impoſed upon with common Spirits. To try the Standard or Strength of Brandy or Spirits, pour out into a Wine Glaſs better than a third Part of the Glaſs full, take it up in one Hand and cover the Glaſs well with the other Hand, then ſhake it till the Bubbles riſe, and ſo ſet it down; if the Bubbles continue a top ſeveral Minutes after it's ſet down, it's of a right Body; but if they inſtantly fall, and the Liquor look whitiſh, it's too low and weak. This is a ſurer Way than looking whether it leaves Streaks like Oil hanging on the Glaſs. Burying Caſks of Brandy in the Earth, or putting it to lie on the Sea ſome Months, takes off it's hot empyreumatic Taſte, makes it mild in the Mouth and warm upon the Stomach; it's by the laſt of thoſe Stratagems that the *Dutch* impoſe upon us with Moloſſos Spirits inſtead of right *French* Brandy, tho' if we reflect upon the Principles of both I cannot ſee any Harm in the Cheat.

Brandy ſhould be drank very moderately, rather from Neceſſity than Pleaſure, ſo will it be of Service to us, and contribute to our Health. When the Stomach is raw, weak, and lax, a moderate Dram raiſes a pleaſant Warmth, a gentle Tenſion, and better Digeſtion; by rarefying the viſcid Flegm which loaded it, invigorating its Fibres, and making its Coats play with more Agility and Force. When Flatulency or Wind abounds in the Inteſtines, a Dram rarefies the retained groſs perſpirable Matter, and prepares it for an Exploſion upwards or downwards, or ſends it off by Perſpiration; it revives the languid nervous

vous Filaments, affords them new Spirit and Strength for Action, whereby their periſtaltick Motion is promoted. If Colicks proceeding from the ſame Cauſe grieve the Perſon and gripe the Bowels by diſtending their membranous Coats, or Acrimony of the perſpirable Matter pricking their Nerves, a Dram relieves him after the ſame Manner. When the Body is faint and languid, from a Waſte or Diſſipation of the Animal Spirits, from too much Exerciſe, too long watching, faſting, or too low and abſtemious a Diet, whereby the nervous Juice is exhauſted, and the Solids cannot play nor act with their former Vigour, a Dram is ſo ſubtile and fine in all its Parts before it's drunk, that in its very ſwallowing, and as ſoon as it enters the Stomach, it penetrates and ſoaks into the Nerves as ſoon as it touches them, adds to the Elaſticity and Force of the Fibres, invigorates their Vibrations, and takes off all Senſe of Languor or Faintneſs. For the ſame Reaſons when the Circulation of the Blood is languid from the decreaſed Tone of the Veſſels, a Dram excites their Vigour and cauſes a briſker Circulation. After a recent Cold, when the Body is depreſſed, and the natural Evacuation of Perſpiration obſtructed whereby the Conſtitution is loaded, but the Strength diminiſhed, a Dram invigorates the Vibrations of the Solids, accelerates the Motion of the Fluids, promotes their Attenuation, prepares them for Secretions, and paſſing off by the Skin and Kidneys, eſpecially if the Dram be mixed with warm Gruel and a little Honey; it cauſes a profuſe Sweat, and relieves the ſmall Veſſels and excretory Ducts of that ſizy Matter which loaded them and ſtraiten'd or ſhut up their Paſſages. A Dram given in a Decoction of Mallows and Althæa Root, with a little Honey, cleanſes the Kidneys, Ureters, and Bladder powerfully; forces away Sand, ſmall Stones, gravely and ſlimy Matter with the Urine. A moderate Dram uſed in dropſical and cachectic Caſes, where the Body is diſpoſed to be over-bulky and in Danger of Leucophlegmatia, or any other general or particular Tumours from a Laxneſs, Weakneſs, or Languor of the nervous Syſtem, or a Thickneſs and Toughneſs of the Blood, eſpecially of the lymphatic Juices, inſuperable by the wearyed, reſty and weak Fibres: In theſe Caſes a Dram refreſhes and invigorates the Fibres, rarefies the Fluids (tho' a too frequent or exceſſive Uſe of Spirits has the quite contrary Effect) ſtimulates the Veſſels and ſecretory Contractions, cauſes the Blood to flow to the Reins in larger Quantity, and with greater Velocity; hence the Secretion of Urine is encreaſed, and at the ſame Time Perſpiration encouraged. Lethargic and paralytic People find an Advantage

tage from a moderate Dram, for it's Spirits being ſubtile and volatile break and diſcuſs the groſs Humours which loaded and laid by the Nerves from Action; it invigorates the Solids, and rarefies the Fluids. A Dram ſpeedily revives the languid Spirits of the weary Traveller, but herein it comes ſhort of the cold Bath, and even of waſhing the Feet and Legs in tepid Water, or cold Water in Summer. Let a thirſty Perſon that's very warm, firſt take a Dram before he drink Water, ſmall Beer, or Milk, ſo will he prevent the Inconveniencies or fatal Effects which ſwilling down cold ſpiritleſs Liquors produce in ſuch a Caſe, as an Aſthma, ſtuffing of the Lungs, Obſtructions, Inflammations, Impoſtumations of the Bowels, *&c.* It is uſeful in a cold Morning before a Man ſets out on a Journey, for it raiſes a pleaſant Circulation and Warmth in the Body. When the Stomach is jaded and weaken by a Surfeit of tenacious Food the precedeing Day, which have left much Flegm in the excretory Ducts of it's Glands, or exhauſted it's Spirits, a Dram is good before Dinner. A good Dram given to a Soldier when he is entering the Field of Battle encreaſes the Motion of his Blood and Spirits, raiſes Strength and Courage, makes him regardleſs of Danger, and ſcorn Fear and Cowardice; but this Alacrity is only a ſpeedy Flaſh, quickly ſucceeded by a greater Flatneſs and low Spiritedneſs. Drams are chiefly uſeful to Flegmatic Conſtitutions, bulky Bodies or old Age, and ſuch as have weak and lax Stamina, expoſing them to Diſeaſes of the Head and nervous Diſorders or Dropſies, *&c.* They are beſt in cold Weather, foggy Air, wet Seaſons, or after too ſolid or tenacious Foods.

But all theſe good Effects will not counterballance the Miſchiefs done by the indiſcreet and immoderate Uſe of Spirits. All melancholy Tempers are injured by them; for tho' a ſmall Dram rarefies the Blood at firſt, yet the more thin and ſpirituous Parts exhale ſooner, and carry off ſome of the fineſt Serum with them, whereby the Blood becomes thicker, and the Solids more dry and ſtiff. Cholerick Diſpoſitions have their Fibres too much ſtimulated by its Uſe, the Acrimony of the Blood and it's Motion, and Agitation are increaſed by it. The repeated Uſe of unneceſſary Drams in ſanguine Conſtitutions rarefies the Blood at firſt, makes it diſtend the Veſſels, and ſome unprepared Parts ruſh into the Canals of conic Tubes, where they cannot readily paſs; hence Fevers and other Diſorders. A too free Uſe of them in any Conſtitution, puts the Humours into a violent Agitation, whereby their nutritious Parts are unfit to anſwer their Deſign, for this great Rarefaction is often ſucceeded by a Thinneſs and Watryneſs of the Blood; hence an ill Habit of Body, a pale Look, and Decay of the natural Actions. When the Blood is become watry, it's earthy Particles attract one another, and form a viſcous Slime, which furrs up the Inſides of the Veſſels, and ſtill diminiſhes the Action of the Solids more, till they be loaded with a ſizy Mucus; then come on Cachexies, Catarrhs, Dropſies, Palſies, Lethargies, Scurvies, &c. A clear Air, hot Climate, and Summer Seaſon, require leſt of their Aſſiſtance, yet in Summer a Dram is uſeful when the Weather is exceeding hot, and the Springs of the Fibres ſo fallen back, that the Body ſtill ſweats. Childhood and Youthhood forbid their Uſe any further than as a Medicine in ſome particular Caſes; but an Exceſs of the depreſſing Paſſions require a moderate Dram in any Stage of Life, except Infancy or Youthhood. All Diſeaſes, from too great a Conſtriction of the Veſſels, or Contraction of the Fibres, and all Diſorders from too great a Plethora or Rarefaction of the Blood, Diſtempers from a too great Acrimony of the Juices, all Inflammations, Impoſtumations, or Schirroſities of the Bowels, abſolutely forbid their Uſe; Aſthmas, tickling dry Coughs, cretaceous Knots in the Lungs, palpitations of the Heart, concretions of fleſhy Subſtances in the Veſſels, ardent Fevers, &c. are rendred much worſe by the leaſt Indulgence of Drams. All Spirits cauſe Drunkenneſs by an Overfuſion of the Fluids and Diſtention of their containing Veſſels; hence Headachs and Pains from ſaline *Spicula* darting into and pricking the relaxed Veſſels and the ſlimy Matter depoſited on their Inſides, which weakens them and ſoaks them with Flegm, till the Perſon becomes paralytic, lethargic, apoplectic, convulſed, ſtupid, &c. and often Spirits kill the Drinker upon the Spot, from all which we cannot help thinking, that the World had been happier, had Men never been accuſtomed to Brandy or Spirits; for ſuch as content themſelves with Water, or clear fine Table-beer, are more vigorous, healthy, and long lived than Drammers, who moſtly make themſelves diſeaſed, and at laſt become more like Beaſts than Men.

Rum is another ſpirituous Liquor, often uſed in Punch; it is made in the *Weſt-Indies* of Sugar Canes, and is of a ſtronger Body than Brandy, *i. e.* it contains a larger Quantity of Oil, and leſs Flegm and Salt: It's Oil is leſs attenuated and ſubtilized, whereby it's volatile Salts are more embarraſſed and ſheathed up. Neither is it's Oil reduced to ſuch minute and ſubtile Particles; either becauſe the Canes were leſs fermented with the Water, or becauſe the Oil and Salt of this Cane are more viſcid and groſs, than thoſe of the Moloſſos drawn from the Sugar, which has undergone the ſundry neceſſary Operations, and has been thoroughly fermented afterwards. For altho' all thoroughly fermented Liquors afford much more Spirit, in Proportion to their Body and Kind, than the leſs fermented; yet it is certain, that the ſundry Operations Sugar undergoes in the making, may, and does, break, attenuate, ſeparate, and divide the Principles in the Moloſſos (tho' the groſſeſt of the Sugar) more than theſe ſame Principles exiſting in the crude Cane, where the firm Union of the groſs Oil and Salt makes the unprepared Sugar of almoſt a loathſome luſcious Taſte. And alſo, all Liquors, thoroughly fermented, have, during the Fermentation, a free Acceſs and Communication with the external Air; whereby the inteſtine Motion is promoted, and the ſmalleſt and moſt ſeparable Parts are too much attenuated and reduced to a ſubtile Aura, which exhales to the depauperating of the Liquor of much of its fineſt Parts; hence it yields leſs (tho' a ſubtiler) Spirit.

That Rum which is of a browniſh, tranſparent Colour, of a ſmooth, oily, grateful Taſte, of a ſtrong Body and Conſiſtence, of a good Age and well kept, is the beſt: That of a clear, limpid Colour, an hot, pungent Taſte, is either too new, or daſhed with Spirits.

To ſuch Palates and Stomachs as can bear it, Rum is certainly preferable to Brandy, either for a Dram or Punch, in many Caſes. Brandy *(e. gr.)* is a Diuretic, becauſe it ſtimulates the Veſſels, and rarefies the Blood, whereby only its finer and more ſerous Parts are ſtrained off by the Kidneys: But Rum not only ſtimulates by its Salts, but lubricates by its more and groſſer Oil, and thereby expands and dilates the renal lateral Veſſels; whereby, not only the thinner, but alſo the groſſer and more excrementitious Parts of the Blood are allowed a ready Paſſage thro' the renal Strainers, and get off by the Ureters. Again, where the Veſſels are ſluggiſh, and the Blood ſizy, Brandy promotes Perſpiration in a gouty Habit, and forces off Part of the Salts by Urine; as it, at the ſame Time, carries much eſſential vegetable Salt into the Blood; but Rum ſoftens and dilates the Veſſels more: Hence a freer Perſpiration both of Salts and Seroſities, as well as a Diſcharge by Urine; and at the ſame Time it conveys leſs Salt into the Blood, and its more and groſſy Oil ſheaths the Remaining Acrimony of the Blood, which anſwers two valuable Intentions, 1. It thereby dilates the corrugated capillary Veſſels, wherein the gouty Matter was ſtopped and lodged, and the Relaxation of the Veſſels gives Nature an Opportunity to pour in thinner Fluids upon theſe gritty Lodgments and ſharp Matter, whereby they are diluted, diſſolved, thruſt forward, and expelled by the excretory Ducts of the Skin. 2. It blunts the Edges of the pointed pricking Salts, and obtunds the reigning Acrimony,

crimony, makes it leſs uneaſy to the Patient, till the elaſtic Veſſels can attenuate, ſeparate, and diſſolve it, ſo as to be either perſpired or thrown back into the Blood, till it arrive at and be ſtrained off by the Kidneys.

In nephritic Pains and gravely Caſes, where the Veſſels are always much contracted, and ſometimes inflamed, the Uſe of Rum is preferable to that of Brandy; becauſe it relaxes the Contraction more, increaſes the Stream of Urine, and makes Way for the obſtructed Matter to paſs off, or be forced and waſhed out of the Channels. Bilious Conſtitutions can bear the Uſe of Rum diluted with Water better than Brandy, becauſe their Solids being elaſtic and contracted, and their Veſſels narrow, and Fluids acrimonious, for whatever blunts the Acrimony of their Juices, and ſoftens and dilates their Fibres and Veſſels more, muſt be beneficial: On the contrary, whatever adds to the Stimulation and Contraction of their Solids, and the Sharpneſs and Saltneſs of their Fluids, muſt unavoidably be hurtful. All ſuch as have more elaſtic Fibres, contracted Veſſels, ſharp and thin Juices, lean and ſlender Bodies, if they will be medling with Drams (which, if they prefer Health and long Life, to Taſte and Luxury, they ſhou'd uſe but as Medicines, *i.e.* from Neceſſity, not Choice or Pleaſure) ſhou'd prefer Rum.

Hard Drinkers who have broken their Conſtitutions by frequent Debauches, will have a moderate Dram, that will not only raiſe, but preſerve the Tone of the Stomach, maintain and ſtrengthen good Digeſtion, and keep them from being too much damped; here Rum ſhou'd take Place of Brandy, not only becauſe it fills and invigorates the nervous Tubes with leſs volatile and more durable Spirits; but at the ſame Time it's Oil blunts the Points of the Salts, which other Liquors have left too plentiful in the Blood.

In chronical Aſthma's, Coughs, and Stuffing of the Lungs, if any moderate Dram may be allowed, Rum is the beſt, becauſe it's Spirits are leſs volatile, it's Oil more and groſſer, to ſmooth the ſtiff and contracted Veſſels, expand their Sides, make Way for Spitting, and by it's ſolid Particles clearing the Tubes of ſome Parts of their infarting Load.

In choleric Diſorders, from acrimony, pricking, paining, and tearing the nervous Threads, Rum offers fairer for Relief than Brandy, becauſe it is more oily, ſmooth, and ſoftening. It is alſo more ſuitable to old Age, becauſe, at the ſame Time it ſtimulates, it alſo lubricates and dilates the Veſſels, whereby they keep longer open and paſſable, the ſtraitening ſhutting up, and Coaleſcence of which, is the only Cauſe of old Age and natural Death.

In recent great Colds, without a Fever, Rum is more ſerviceable than Brandy, provokes both Perſpiration and Urine more powerfully, as it ſheaths the Salts, makes their ſtimulus leſs ſenſible, and contracts the Veſſels leſs; nay, its Sulphur ſmooths and dilates them more.

When the Perſon is very hot and thirſty, a Dram of Rum is much better to drink than Brandy, before Water, ſmall Beer, or Milk; for this keeps the Veſſels more pliable, dilated, and lax, maintains a freer Courſe for the Fluids to paſs without Lett or Stoppage. For the Miſchiefs done by Water, or ſuch ſmall Liquors in this Caſe, is, being drunk cold, they ſuddenly contract the Veſſels ſo as the Liquids cannot paſs, their fineſt and thinneſt Parts are diſcharged thro' the Interſtices, or forced along the Tubes, whilſt the more groſs are obſtructed, fixed, and wedged in; hence Obſtructions, Stagnations, Inflammations, Ulcerations, or Mortifications, or Schirrus's and carcinomatous Tumours of ſome *Viſcera* of the lower Belly.

But for theſe Reaſons, phlegmatic and corpulent People muſt ſtill allow Brandy the Preference, becauſe it ſtimulates more, and raiſes a greater Contraction; for it abounds more with Salts, and its Oil is more ſubtile, exiſts in ſmaller Particles in the Liquor, and their Veſſels and Fibres are ſo ſoaked in inſipid Humidities, and relaxed with Oil, that they want no Lubrication, nor the Salts in their Blood any Abſorbent. Cachectic, hydropic, lethargic, and paralytic Perſons muſt alſo chuſe Brandy on the ſame Account; and ſo muſt thoſe who have furr'd-up Veſſels and foul Glands (which raiſe ſcrophulous Knots, œdematous Swellings, whether fixed or ſhifting) for the Spirits of Brandy being more fine and ſubtile, they rarefy the Blood and ſtimulate the Veſſels more. In exceſſive hot Weather, when the Fibres are much relaxed, and Perſpiration or Sweat profuſe, Brandy muſt have the Precedency, becauſe it ſtimulates and contracts more, and rarefies the thick and ſizy Matter better, raiſes a briſker Motion in all the Juices; tho' it muſt be owned, that theſe its good Effects are but of ſhort Standing.

In a moiſt, foggy, or marſhy Air, where the Moiſture hangs upon the Skin, and ſtraitens or ſtops the Mouths of its excretory Ducts, and diminiſhes Perſpiration; or where the Spring of the Air is weakened or broke, ſo that it neither expands it ſelf ſufficiently in our Lungs, Food, nor Blood, but renders the Juices both Ways ſizy, a Dram of Brandy is better than Rum.

But in an infected Air, Rum is before Brandy, becauſe it leaves more Oil in the Mouth and Throat, which entangles and imbibes the infectious *Effluvia*, or *Miaſmata*, floating about and hanging in the Atmoſphere, and ſucked in together with the Air: And in this Caſe, the greateſt Preſervative is, to ſpit out all our Spittle, whilſt we are in that infected Air; but eſpecially when we are in the Houſes or about the Beds of the Sick: But in this Caſe, Sack exceeds both.

But becauſe Rum is more balſamic, and leſs volatile, an Exceſs of it is overcome with more Difficulty; becauſe 'tis of harder Digeſtion in the Body, and loads the Veſſels more, and ſo the Abundance of its Oil may prevent the Pungency of the Salts; yet all Oils, when the Watry Part of the Blood is much drained off, become rancid, diſpoſe the Blood to Coagulations and Stagnations, the Effects whereof are Chronic, and often dangerous Diſorders. It is true, Spirits of the Grape do alſo coagulate the Blood; but that is upon another Account, *viz.* Thirſt; the ſpeedy and great Rarefaction of our Juices, whereby they get into too ſmall Veſſels, where they are driven forward, till the Motion of the more earthy and ſaline Parts are firſt retarded, and then ſtopped; have their watry and more ſerous Parts ſqueezed forwards by the *Conatus* of the Sides of the Veſſels to come together: Thus the more fluid Parts are expelled and groſſer retained: Hence the Blood becomes thick and ſizy. 2. All Spirits of Wine coagulate the Blood from the vaſt Quantity of Salts they contain; which Salts being of a moſt attractive Nature, they not only attract themſelves, but alſo the earthy Parts of the Blood, render it thick, black, and grumous; the thinner Parts being ſeparated and expreſſed. But it does not herefrom follow, that, becauſe Spirits thicken the Blood, they are therefore proper in a too thin and diſſolved State of this Fluid; for the Salts ſtimulate the Veſſels too much, heat the Body to an intenſe Degree, cauſe an Hectic and Waſte, by encreaſing the Force and Reſiſtance of the Solids, and their Triumph over, and the Attenuation of the Fluids: And not only do the Salts ſtimulate, but abrade and wear the Inſides of the Veſſels, ſo that both Solids and Fluids are damaged, and brings the Body into languiſhing Atrophy, and Death concludes the tragical Scene.

It is on the ſame Account that a liberal Indulgence of White-Wine brings on a *Chloroſis*, Paleneſs of Countenance, Leanneſs of Body, and Death: And this is chiefly the Fate of thoſe who accuſtom themſelves to morning Whets, which are the Ruin of many brave Conſtitutions.

Rack, or Arack, is brought to us from the Eaſtern World, as Rum is from the Weſtern: It is the Product of Rice, which abounds very much with Oil, and grows chiefly on very fat Earth in hot Countries, where the Sun's great Heat, and the great Plenty of Sulphur in the Earth, cauſes a very plentiful Aſcenſion of that Principle into the Ears of the Grain.

Rack exceeds Rum much more than that did Brandy: It is more ſoftening, balſamic, reſtorative, and amicable to Nature; us'd either in Drams or Punch it makes much leſs Waſte and Wear of the ſmall Veſſels. Its chief Principle, next to Flegm, is a fine ſubtile Oil, of ſuch minute Parts, that it readily incorporates with Water: Therefore it is better in all Caſes, where repeated Debauches have worn and abraded the internal Surfaces of the Veſſels by much Saline, or other ſolid Particles, ſent into, and kept in too large a Porportion in the Blood; or where our Juices are too ſharp, acrimonious and Pungent. Wherefore Rack ſhould be chiefly preferred by gouty Perſons, and others that cannot comply with a ſober temperate, and rational Life, for Reaſons already inſiſted upon in what we have ſaid above concerning the Nature of Rum. It is more adviſable in a clear Air, to aged Perſons, bilious Conſtitutions, or when the Fibres are too ſtrong and elaſtick, or the Fluids too thin, agitated, diſſolved, waſted, or ſaline; or where ſharp, tickling, dry Coughs attend, or the trachæal Ducts are too dry and rough, or the Blood too ſharp and corroding, cauſing frequent Hæmorrhages of the Blood (but here, truly, no man that preferrs Life to Taſte, Cuſtom, and Company, ſhould indulge the Uſe of any Spirits) and Looſneſſes. Thin, lean Habits can bear this better than any other Spirits. A moderate Dram of it is a great Friend to *Venus*; becauſe it is not only ſubtile, and a little ſtimulating, but ſoft, ſmooth and balſamick, and helps to fill theſe Veſſels with a ſuitable Liquor. It exceeds in all thoſe Caſes, where Rum is recommended, and has much the Preference of it. For Satisfaction herein, I ſhall refer you to what I have ſaid above concerning Rum; which, for Brevity's ſake, I ſhall not now repeat.

But Rack is ſtill worſe in thoſe Circumſtances where Brandy is preferable to Rum; becauſe it has leſs Salts and more Oil, is harder of Digeſtion, ſooner turns rancid, cauſes more and greater Obſtructions, is injurious therefore to phlegmatic Conſtitutions, to Perſons of lax Solids, and ſizy or thick Fluids.

The oftner I reflect on the Miſchief done by diſtilled Spirits, the more I am confirmed that the human Race had been happier had Drams never been known, and cannot help cordially joyning with Dr.

Allen

Allen (Synopſis Medicin. Art. 1633, 1634.) *That the plentiful devouring of thoſe Spirits has killed ſo many thouſands of Men as there are Stars in the Sky: Nay, ten Times ten hundreds of Thouſands have died by theſe, more than all the reſt of Poiſons whatever. This Poiſon not only occaſions violent Diſtempers in a great many, but alſo ſometimes ſudden Death in ſome; wherefore if vinous Spirits deſerve not the Name of a Poiſon, he neither can learn nor conjecture what elſe they ſhould be called, for taken inwardly they are detrimental almoſt to all Animals.* And that theſe Effects of Spirits are not Fancy or Opinion, Mr. *Hales* has proved from Experiment (*Hæma Staticks p.* 128, 129.) That *Brandy contracts the Coats of the Blood Veſſels, and thickens the Blood and Humours, both which Effects contribute to the ſudden heating of the Blood, by much encreaſing thereby its Friction in the contracted capiliary Veſſels; which ſudden Heat is alſo further encreaſed by the mere Mixture of Brandy with the Blood, which glowing Heat ſoon ceaſes. Hence it is the unhappy habitual Drinkers of Brandy and other diſtilled ſpirituous Liquors do ſo inſatiably from Time to Time thirſt to drink of that deadly Liquor, which by often heating the Blood and contracting the Blood Veſſels, does by Degrees reduce them to ſuch a cold, relaxed, and languid State, as moſt impetuouſly drives them to ſeek their Relief in that Liquor, which they too well know both by their own Experience, as well as by the dayly Deſtruction of thouſands, to be ſo very baneful and deadly, as to become by the great Abuſe of them the moſt epidemical and deſtructive Plague that ever befel Mankind.* Whatever Service a ſeaſonable moderate Dram may be of, when taken as a Medicine, yet this beyond all peradventure is and will be the Reſult of a habitual Uſe, or Abuſe of thoſe Spirits, whilſt human Fabricks conſiſt of the Materials they now do. And if theſe are the Effects of Brandy on Animal Bodies, what can we ſay for unneceſſary cuſtomary Tippling of Punch, which is only now two Parts Water to one of Brandy, with Lemon or Orange Juice added, both which are alſo Contracters of the Veſſels, and Thickners of the Blood like other Acids. I have often wondered that ſeeming Bravery which could ſwallow down liquid Fire, as Mountebanks and Jugglers do lighted Tow or Flax, ſhould yet be ſo cowardly as to boggle at the Uſe of mineral Spirits more than Vegetable, and ſo have *Aqua Fortis* or *Aqua Regia* become a common Tipple, the unneceſſary Uſe of both terminate in the ſame Thing, Death, Death; and the known Effects of both make the imprudent Drinker *Felo de ſe*: Tho' both acid and alcaline Spirits, Pills and Bolus's are good Medicines yet what wiſe or honeſt Man would make a Bowl of Punch of the firſt, or a Diſh of Meat of the laſt, for Uſe.

Of thoſe Spirits is Punch made, into the Nature of which we ſhall briefly enquire.

The Uſe of Sugar in Punch, is, to give it a more agreeable Taſte, to ſheath the acids of the Lemon, and prevent Gripes, Flatulency, Pricking and Pain in the Bowels. The Sugar for this Uſe ſhould be well refined, very white, hard, and ſparkling when broken, like ſmall Cryſtals, and of a pleaſant ſmell, ſomewhat like that of a Violet.

Lemons are an Acid, and quench Thirſt by ſtimulating the ſluggiſh Glands and ſecretory Ducts. Their Juice puts a Stop to the Blood's Rarefaction, and thickens it when over thin, ſtops its too rapid Motion, and therefore is very ſerviceable in ardent Fevers, and all Poiſons which act by diſtending and relaxing the Veſſels, and over-rarefying the Fluids; ſuch as Poppies, Opium, Hen-bane, *Coculus Indiæ*, &c. Lemons ſtrengthen the Stomach by giving a freſh Tone to its palled Fibres, and thereby envigorating it: They provoke Urine by giving the renal Strainers a pleaſing Stimulancy, and obtunding the *Alkali* and Salts of the Blood, and cauſing the Fibres to ſhake off their ſlimy adheſive *Mucus*. They are very ſerviceable in Headachs, and all Pains which proceed from a rarefied and thin Blood, ſtretching and paining the Veſſels. They reſtore the Craſis of the decayed Blood very ſucceſsfully. Their Acidity makes their Uſe very ſucceſsful in an Overflowing of the Bile, or where there is a Predominancy of bilious Humours in the Body; becauſe they draw up the relaxed Strainers of the Liver, and give a too fluid Blood a better Conſiſtence.

They are no leſs ſerviceable in a *Dabetes*; for altho' they be diuretic, yet they thicken the Blood like other Acids, contract the renal Glands, and check the Force or Power of the *Alkali* in the Blood. They are excellently adapted to very hot and dry Weather and Climates; and to bilious Conſtitutions, and ſuch as are diſpoſed to Chachexies and Dropſies: They are no leſs uſeful to ſuch as have weak and relaxed Fibres and Veſſels. They give an agreeable acid Taſte to ſeveral Sauces and Meats: They are moſt efficacious in Vomitings, eſpecially of green, yellow, ruſty Matter. Their outward Rind, or Peel, heats the Body as the Juice cools it. It is an excellent ſtomachic, antiſcorbutic; and comes in good Play againſt Agues, and all Diſeaſes from a Viſcidity of the Blood; becauſe it abounds with a fine ſubtile Oil and volatile Salt, which give the Blood a greater *Momentum*, break its Coheſions and Attractions, encreaſe its Motion and Agitation in the Veſſels,

ſels, promote Perſpiration, leſſen the Quantity of Humours, and relieve the oppreſſed Veſſels of a Part of their Load.

But wherever the Blood is too thick, Lemon Juice is hurtful; becauſe Acids thicken it more, and make the Veſſels ſtiffer and ſtronger. Where an acid Salt prevails in the Blood, Lemons are prejudicial; for they add to the Acidity, becauſe their Juice abounds in acid Salt and Phlegm, but has little Oil. Their Juice, uſed to Exceſs, cools too much, condenſes the perſpirable Matter, fills the Bowels with Wind: Hence Indigeſtion, Flatulency, Vapours, ſour Belching, Gripes, and chronical Pains. But Sugar added to the Juice prevents its bad Effects, and makes it more friendly to the Stomach, as the firſt ſheaths up the Acidity of the laſt, and hinders its Pricking or Paining the Coats and Nerves of the Bowels. They are hurtful to phlegmatic Conſtitutions, old Age, and to the Inhabitants of cold and moiſt Countries; becauſe they cool and thicken the Juices of the Body too much. The beſt Lemons for Punch are thoſe that come from hot Countries, large, ſoft, of an aromatic and pungent Smell and Taſte. The leaſt Speck of a pricked Lemon will ſpoil a whole Bowl of Punch. Lemons in Punch make it more diuretic, help to prevent Drunkenneſs, and the overheating of the Body with Sugar and Spirits: They hinder the Blood's Rarefaction, and exceſſive Thirſt.

Seville Oranges have leſs acid Salt in them than Lemons; and this Salt is entangled in a more ropy, viſcous Phlegm than that of Lemons; therefore a larger Quantity of Lemon Juice is neceſſary, as it is leſs acid. Both of them contain but little Oil, and the Nature and Properties of their Juices are ſo much the ſame, that we need not inſiſt any further upon either.

What we have already advanced on the Properties of the ſundry Ingredients of Punch, will facilitate our Labour here, and comprehend what we have to ſay upon it in a very few Words. Punch therefore of a right Strength (which ſhould at leaſt be three Parts Water to one of Brandy, except to gouty or aged Perſons, who require it ſtronger) and moderately drunk, is an admirable Liquor (provided it be made of *French* Brandy, or of good old Moloſſos Spirits, which if rightly made, kept, of a ſtrong Body, and purifyed ſome Months with Sea Air, are every whit as good) and an excellent Diuretic; it powerfully cleanſes Kidneys, Ureters and Bladder from ſmall Stones, Sand, and ſabulous Matter, from the Thinneſs of the Liquor, ſubtile Oil, and volatile Salts of the Spirits, Oil and fixed Salt of the Sugar, and auſtere Salts of the Lemon; which waſh off, ſeparate, and diſſolve theſe Coheſions in the urinary Paſſages: The Acidity of the Lemon gives a *Stimulus* to the Veſſels, and at the ſame Time the Salts encreaſe the *Momentum* of the Blood.

Not only are theſe viſcid and ſizy Combinations of the Blood broken and diſſolved, and the Juices attenuated and thinned in the urinary Paſſages and Strainers, but all over the Body; therefore will theſe volatile Salts clear and cleanſe the ſecretory and excretory Ducts of the Skin, and promote a free Perſpiration, which makes Punch very ſerviceable in recent Colds.

Weak Punch checks a febrile Heat, and prevents the too great Fluidity or Rarefaction of the Blood; in the firſt Caſe, it reſtores the due Conſiſtency of the whole Maſs, and makes it fitter to paſs the reſpective Strainers of the Body, as it dilutes the Juices, gently ſtimulates the Veſſels, thins, grinds down, and forces forward the obſtructed Matter thrown into the capillary Ducts, during the Blood's Rarefaction. For all Heat in the animal Body, ariſes from an increaſed Action of the Solids againſt the Fluids, and of the Fluids reſiſting the Solids, and both mutually acting upon, and reſiſting one another, grinding down, and deſtroying the globular Part of the Blood, ſo as it is enabled to enter the Orifices of ſmaller Veſſels, than its reſpective containing Tubes; and as it advances forward in theſe Capillaries, its Motion becomes ſlower, and the Action of the Veſſels upon it greater, and the Propulſion of the Blood behind, ſtronger; all which encreaſe the Body's Heat, the Blood's Attrition and Waſte; and indicate the Uſe of a Liquor that may thin, cool, and check the Blood's Motion and Fury, and the Dryneſs and Parchedneſs of the exhauſted and weakened Veſſels. And ſuch a Liquor is this weak Punch, made pretty acid. This anſwers the ſecond Intention, which was the Prevention of the Blood's too great Fluidity, or its Arrival at ſuch a State as I juſt now mentioned.

If Punch be drunk very acid, it checks the Over-flowing of the Gall, and the Redundancy of *Alkali* and Acrimony, and oily Sharpneſs: And therefore ſhould be proper in a Jaundice; but that the Veſſels of the Liver are hereby ſtimulated and contracted, and the Contraction or Obſtruction of the hepatic Veſſels is the Cauſe of the Diſtemper, and therefore whatever corrugates them more muſt exaſperate and not remedy the Diſeaſe.

It is a great Friend to a palled and relaxed Stomach; it thins and carries off its Slime and *Mucus*, ſweetly Stimulates and reſtores the decayed Tone of its Fibres: It cures ſtinking, bitter, and nidious Belchings and Vomitings, which always proceed either from an alkaline or oily Acrimony. It helps Indigeſtion and Want of Appetite, by ſtimulating, and ſupplying with nervous Spirits the relaxed muſcular Coats of the Stomach. It is an Antidote againſt bilious Cholicks, Gripes, and blackiſh, frothy, fætid Stools, which proceed from too much Bile. It invigorates the Fibres and Solids, as well as dilutes the Fluids, whereby Secretions and Evacuations are carried on more regularly: It ſcowrs and excites the ſluggiſh, furred up, and reſty Tubes of the Glands; and therefore is of ſingular Uſe in Cachexies, Dropſies, Leucophlegmacies, ſcrobutic, leprous, and ſcrophulous Habits: All which are owing either to a viſcid, or alkalious State of the Fluids; and ſome of them to a weak and relaxed State of the Solids; from which alſo ſpring lethargic, paralytic, and comatous Indiſpoſitions; And therefore, weak and acid Punch will make a proper Drink. It is a notable Cooler in hot Weather, and a Preſervative in an infectious Air. And becauſe it raiſes the Solids, dilutes the Fluids (if not too acid) forces forward obſtructing Matter in the ſmall Veſſels of the extreme Parts, and promotes Perſpiration, it is therefore good in the Gout.

It is the beſt Liquor in the World to them who have palled and weak Stomachs, Indigeſtion and Want of Appetite, from frequent Debauches with Malt Liquors, luſcious thick Wines, Idleneſs, and Want of Exerciſe; which have foul'd the Glands and indiſpoſed the Body. The Univerſe cannot afford a better Liquor for Phlegmatic Conſtitutions, and bulky Bodies. Students, who have loſt Appetite and Digeſtion, or contracted a cachectic Habit of Body, may expect much Relief from this, and Exerciſe, in a clear Air. Whenever the Blood abounds with too much Sulphur, Mucus, or alkalious Salts, this is an incomparable Draught for ordinary. But in theſe Caſes its Uſe muſt be laid aſide, when it hath anſwered its End, leſt it occaſion Illneſſes of a contrary Nature.

But altho' it oblige us with all theſe, and ſeveral other good Services, in a high Degree, yet it is injurious to choleric Tempers, and thin, lean Habits; for it wears their Veſſels, ſends off the nurtritive Parts of their Blood by Urine, encreaſes the Elaſticity of their Fibres, promotes their Perſpiration, and adds to their Evacuation. It likewiſe encreaſes the Rigour and Stiffneſs of old Peoples Veſſels and Solids, and ſends off precipitantly the fineſt of their Fluids by Urine. It is highly injurious to them who have large and unpaſſable Stones lying dormant in their Kidneys: For it augments the Current of the Water, enlarges the Cavity of the *Pelvis*, moves the Stone out of its Repoſitory, ry, raiſes moſt excruciating Pains and Death. It is deſtructive to Hectical Perſons, becauſe it wears and waſtes their Solids too faſt, and exhauſts their remaining Fluids, by immoderate Perſpiration and Urine. It is no leſs hurtful to them, who have Ulcers in their urinary Paſſages, as it commands a more impetuous Flux of Humour into theſe Parts; and the Salts of the Urine inflame and irritate them more. For the ſame Reaſon, its Uſe cannot be adviſed, nor ſafe, in ulcerated Lungs, tickling Coughs, *&c.* where Abortion is threatened; whatever irritates and ſtimulates theſe Parts, muſt create a Miſcarriage. In a Dyſury or Scalding and Heat of Urine from its Acrimony, Punch adds to its Acidity, and increaſes the Heat and Inflammation; therefore its Uſe muſt not be allowed. Thoſe whoſe Stomachs have a very thin mucous Coat, cannot drink it without a Pain at their Stomachs.

In arthritic Pains, Punch aggravates the Symptoms, both as it adds to the Sharpneſs, and encourages Inflammations. To the more laborious and drudging Part of Mankind, it is juſt nothing at all; for it ſends off the nutritious Juices, which ſhould repair their Waſte, and wears their Fibres and Veſſels.

As I have given Rum and Arrack a ſeparate Article, its needleſs here to be tedious in diſcourſing on their Punch. It is enough, to add briefly, that as theſe Liquors are of a ſtronger Body and more oily and balſamick Nature than Brandy: So they are better (if not made too acid with Lemon) for gouty, aged, and bilious People; for Arrack, containing much fine ſmall Oil, it lubricates and dilates the Paſſages and Veſſels, makes way for the Matter of gouty and arthritick Pains to paſs off through the Veſſels. The Water, Sugar, Rum, or Arrack, do all join to leſſen or take off the perpetual Stimulus of bilious Perſons Fibres, to ſheath the Acrimony of their Blood and Juices, to keep the Veſſels more extended, and ſo preſerve the elaſtick Solids from triumphing over the too much attenuated and diſſolved Fluids. Rum, or Arrack Punch makes a noble Diuretick, cleanſes the Glands, excretory Ducts and Pelvis of the Kidneys from all Congeſtions of gravelly Matter; this Punch, if little or no Acid be added to it, is a much better and ſafer Drink in tickling Coughs, Stuffings of the Lungs, Aſthmas, and other Diſorders of the Breaſt; becauſe the Oil of the Arrack ſoftens and dilates the pulmonary Veſſels, lines their inſide with a fine oily Mucus, removes their Stimulus and Irritation, makes Spitting eaſier; the Salts of the Sugar at the ſame time, deterge, break, ſeparate, and cleanſe away the viſcid, inactive, or gritty Matter which ſtuffed the Veſſels. It agrees better with ſuch as have a thin mucous Lining on their Stomach, excites Pain leſs; (but indeed this is chiefly the Fault of the Lemon or Acid in any Punch.) If drunk in a moderate Quantity, it intoxicates leſs, and raiſes not ſo much Pain in the Head, becauſe it has fewer Salts to fix into and prick the delicate Veſſels of the Brain. In a Word, its Uſe is more ſafe in any too elaſtic or rigid State of the Fibres and Veſſels, as it ſtimulates leſs, raiſes not ſuch a rapid Circulation, Attenuation, and Attrition of the Juices.

But Brandy-Punch muſt have the Preference in febrile Heats, quenching Thirſt, cooling and refreſhing; therefore this is more adapted for Summer Service, and the other to Winter Uſe. This muſt alſo be preferred in all Conſtitutions which have an alcaline or oily Acrimony predominant in them, becauſe it has more Salts and leſs Oil, as in hot, ſharp, oily, bitteriſh Vomitings, ſlight Inflammations, tendency to Gangrenes or Mortifications; black, livid or pale Eroſions, loſs of Appetite, loathing of Food; looſe, moſt fetid, ſhining, dark, or blackiſh Stools; very brown, ſharp, fetid, thick, froathy Urine, half putrified when made, and depoſites little Sediment and Sweat of the like Nature, in a thin, diſſolved, florid, ſcarce, coagulating Blood; in Decolorations, and Bliſters riſing on the Skin, in frequent Eruptions of purple or livid Spots and Buboes; in a ſtinking, cadeverous fetid Breath, in a bitter, ſtinking, oily, or ſalt Taſte of the Mouth, in a rancid, fat, ſharp Taſte of the Mouth like burnt Oil; in nidrous, hot Belchings, ſmelling like rotten Eggs, or Sulphur; in fat, white, fetid Stools, feeling exceeding hot in the Paſſage; in Scurffs, Dandriff, Leproſy, or large, hot, ichorous Eruptions on the Skin; in all lethargic, paralytic, apoplectic, and comatoſe Diſpoſitions; in all hydropic, ſcrophulous, cachectic Habits; in all Viſcidity and Sizineſs of the Juices, Foulneſs, Loading, Dilatation or Stuffing of the Glands with ſlimy Matter; and in a too great Weakneſs, Laxneſs, and Imbecility of the Fibres, Solids, or Veſſels, Brandy-Punch exceeds that of Arrack or Rum, becauſe it is more ſaline, ſtimulating, and deterging, *&c.* but where there are manifeſt Signs of an Acidity in the Blood, Arrack comes in better Play.

Mileſii Niſſeni de Ebrietate Epigramma.

Ebrietas commune Malum, ſuaviſſima Peſtis,
Hæc mea per Titulos Fama feretur, ait:
Illa ego Terrarum Domitrix, Regina Malorum,
Quæ clarum toto Nomen in orbe gero.
Dux Scelerum ſuprema vocor, Vitiique Magiſtra,
Nil niſi dulce Malum, nil niſi dulce Nefas.
Mors Animi, gratúſque Furor, blandúmque. Venenum,
Morborum placidus Fons, et amica Lues.
Gurgulio, Fundi Barathrum, Cenſúſque Vorago,
Ultio ſum præſens, ipſaque Pœna mihi.
Syrtis, Hydrops, Syren, Scylla, inſatiata Charybdis,
Grandior & Furiis omnibus eſſe feror.
Nam quæ geſtarum mihi ſurgat Gloria Rerum,
Notum eſt eois occiduíſque Plagis.
Nullus erat ſævis unquamt Bellator in Armis,
Qui dederit gelidæ millia plura Neci.
Nemo tot impune Cædes, tot Funera Nemo,
Edidit, ac noſtræ ſæpe dedere Manus.
At mihi quæ Generis Series ab Origine pergat,
Aut quæ ſint Partûs Pignora chara mei,
Quæ Mala, quantaque Damna feram Mortalibus ægris
Quo ſim victa Modo, quo reprimenda Metu.

Of CYDER.

THIS Liquor owes its Invention to a *Norman*, who much admired the delicate Flavour of Apples: And long Obſervation aſſures us, that ſuch as chiefly drink Cyder are more healthy and ſtrong, and have a better Complection than ſuch as are accuſtomed to Wine or Ale. Both my Lord *Bacon* and Dr. *Baynard* tell us of ſeveral Perſons near a hundred, and ſome above, who, having ſeldom uſed any other Liquor, were very active and vigorous at that Age. It is certainly more nouriſhing than Wine, for not being ſo thoroughly fermented, its Spirits are leſs ſubtile and impetuous, and being more intangled in a viſcous Phlegm, and more diluted with Water, they exhale not ſo ſpeedily. And becauſe it is leſs ſpirituous than Wine, it is therefore more

cooling and moiſtening, and leſs intoxicating; but for the ſame Reaſon, when it's drunk to Exceſs, its Effects laſt longer; for its viſcous Parts prevent the ſudden Diſſipation of its Spirits; beſides, the Viſcidities are alſo diſperſed in the Veſſels of the Brain, and ſo fill up its ſmall Tubes as to obſtruct the briſk Motion of the nervous Juice, and leſſen its Influx. The viſcous Parts being the lighteſt, they will always lie next the Sides of the Channels, while the more fluid Parts keep the Axis, and therefore the like Quantity of this Liquor will not invigorate ſo much, or ſo ſpeedily as Wine. But then after a drunken Bout of Cyder the ſmall Veſſels require a longer Time to reaſſume their Elaſticity, to attenuate and ſhake off the adhering Viſcidities from their Inſides: and becauſe the more viſcous Parts of the Liquor are neareſt the Sides of the Veſſels, the watry Parts next them, and the more ſubtile Parts keep the Axis, therefore Perſons drunk with Cyder are more ſtupid, ſleepy, pale, and cold, than thoſe that are intoxicated with more ſpirituous Liquors, ſuch as Wine, Brandy, Punch, *&c.* Theſe being more ſpirituous, *i. e.* having a greater Quantity of attenuated eſſential Oil and Salt in them, give a greater Stimulus to the Veſſels, raiſe a briſker Pulſe, and make Perſons more cheerful and merry, frantick or mad; but Cyder abounding more with a viſcous Phlegm than Wine, will therefore nouriſh more, and its Nutrition be of longer Continuance, tho' not equal to pale Ale.

The Properties and Effects of Cyder differ according to the Difference of the Fruit it is made of, its Preparation, Keeping, Age and Body: The greateſt Part is made of harſh, wild, common Apples, ſuch as grow plentifully in the Fields of *Herefordſhire*, *Worceſterſhire*, and *Gloceſterſhire*; ſome is made of fine Table Fruit, as Golden, Kentiſh, and *Kerton* Pipins, Pearmains, *&c.* and ſome of a Mixture of theſe Fruits. That is the beſt Cyder which has moſt Plenty of eſſential Salt and Oil, and theſe well attenuated, diſſolved, and rarefied by Fermentation, till they be reduced to ſuch ſubtile Parts as afford a Spirit like that of Wine or Ale. What is made of wild, harſh Apples will keep longer than the ſweet Cyder which is made of table Fruit, becauſe it has much more eſſential Salt, which is its tartarous Part, and gives it its rough Taſte. This Plenty of Tartar breaks and diſſolves the Sulphur into very ſmall Particles, and reduces it to a ſubtile Spirit, which abounds in this Liquor, and is retained by the fine Salts, ſo that this Cyder neither dies, corrupts, nor turns rancid ſo ſoon as the other: For the like Reaſon it requires to be longer kept before it come to Perfection, that is before it depoſite its Tartar and

Fæces, and reaſſume its Spirit from the Mother. But ſweet Cyder having more and groſſer Oil, and leſs eſſential Salt, the laſt is not ſufficient to excite a compleat Fermentation, *i. e.* to attenuate and diſſolve the Oil by ſtrong repeated Occurſions and Colliſions; nor does their Action upon one another break and ſtrip them of their Viſcidities which ſheath them, for which Reaſon this Cyder gives no Pungency to the Taſte, nor Irritation to the Stomach, it dies ſoon, or becomes rancid and ſour; the ſubtile Salts and Sulphur, or Spirits, are not in full Proportion intermixed with the Liquor to prevent the active Attraction of the different Principles, but either the few ſubtile Spirits are united again with the Salts, and ſo the Liquor turns ſour, or they exhale and leave it vapid and dead. Very watry and inſipid Apples yield a taſteleſs Cyder which ſoon become flat and thick, becauſe the Salt and Oil of the Fruit bear no Proportion to its Phlegm; hence its Fermentation is languid, its Viſcidities not broken, its Spirits quickly exhale, and its Tartar is ſo inconſiderable as not to preſerve the Liquor. Cyder that has Water mix'd with the Apple-Juice is liable to the ſame Fate, for the Water over dilutes the eſſential Salt and Oil of the Fruit.

Strong ſweet Cyder is of the Nature of luſcious, half fermented Wine, ſuch as the *Portugal* and *Spaniſh*, which being more ſpirituous, and having a greater Strength, they load the Stomach and diſorder the Head more, and afford leſs good nervous Juice than this Liquor, being only half fermented, and of difficult Digeſtion, ſo as ſweet Cyder has a greater Proportion of Oil than Salts, its Oil is groſſer, not attenuated and ſubtilized to a Spirit; it is therefore admirably fitted for very thin, lean Habits, becauſe its Viſcidity gives a Check to the violent Action and Attrition of the Muſcles, and adds to the Oppoſition of the Blood againſt its Veſſels, is not ſo eaſily digeſted, nor ſo quickly perſpired. Theſe Viſcidities ſheath the ſharp, naked Salts of the Blood, which corrode and tear the ſmall Veſſels, and prevent the Stiffneſs and Rigidity of the Fibres by ſuppling them with their ſoftening Oil. It is an excellent Drink in an Atrophy from an immoderate Waſte of the Fluids by Perſpiration, as it diminiſhes this Evacuation, and ſoftens and relaxes the ſtiffened Fibres with its Oil. And in too great a Fluidity of the Body, from an exceſſive muſcular Force, its Viſcidities abate the violent Action of the Solids, and help the Blood to a better Conſiſtence. Where the Blood abounds with too much Salt whoſe Particles have attracted and formed bulky Corpuſcles, the Phlegm of this Cyder dilutes the Salts, and its Viſcoſity ſheaths them when they are broken and divided into leſſer Particles. It is admirably well adapted for Melancholy Conſtitutions, ſince its Phlegm thins the Blood, and its Oil ſoftens the Fibres. It is a very good Drink for hard Labourers, or ſuch as uſe much Exerciſe, becauſe it ſupples and relaxes their Fibres and Veſſels, affords ſome Recruit of Spirits, and goes but ſlowly off; and is therefore a proper Draught in clear dry Weather, when Perſpiration is full and free.

To choleric Conſtitutions this Liquor is hurtful, becauſe its Oil ſoon turns rancid in the Body, and occaſions an oily Acrimony. Its Uſe is alſo unadviſeable in very hot Weather, when the Solids are too much relaxed, the Blood too much rarefied, and the more fluid Parts are immoderately expended: So in foggy Weather, when the Spring of the Air is weakened or broke, and the Air in the Blood is ſhort of its natural Elaſticity, the liberal Uſe of this Liquor is in Danger to load the Body with crude, viſcid, and indigeſted Juices, which threaten Fevers, Coughs, Colds, or Swellings of the Glands. Old People ſhould forbear it, becauſe their Perſpiration being low, it muſt occaſion Viſcidities in their Blood, not eaſily to be got rid of; and as it has a Tendency to render the Secretions ſlower, and the ſecreted Juices more ſizy, ſuch as are ſubject to moiſt Aſthma's, Catarrhs and Coughs, with expectoration of much viſcid Phlegm, ſhould be aware of it. The Sedentary and Studious ſhould refrain it, ſeeing it affords not Spirits ſufficient for invigorating and employing both the Organs of the intellectual Faculties, and voluntary Motion, and chiefly, becauſe their Fibres become reſty and weak thro' want of Uſe, and their Blood therefore ſizy. Such as are much ſubject to Fear, Sorrow, Grief, or any of the depreſſing Paſſions, would do well to forbear its Uſe, becauſe theſe Paſſions ſubtract from the Vigour and Tone of the Fibres, and add to the Force of the Fluids, till they become viſcid, which Viſcidity is ſtill more encreaſed by this ſweet Cyder. It is very improper for phlegmatick Conſtitutions, which are liable to a Foulneſs and Swelling of the Glands, or a Stagnation of the lymphatick Juices, for it increaſes both the Laxneſs of the Solids, and an undue Mixture and Viſcidity of the Fluids. Such as have weak, cold Stomachs, and bad Digeſtion, or much Flatulency and Crudity in the Bowels, or are afflicted with flatulent Cholick or frequent Stools of white and frothy Excrements, ſhould carefully avoid it, for all half fermented Liquors, or ſuch as have more Oil than Salt, whoſe Oil is groſs, and the Salt not attenuated, but wrapt up in its viſcous Coats, are highly injurious to ſuch Perſons, as they increaſe the Flatulency, and very much relax, weaken, and cool the languid Stomach and Inteſtines: For the ſame Reaſon, ſuch as have Worms or other Inſects, or their *Ova* lying in the Body, ſhould avoid ſweet Cyder. Neither ſhould thoſe who have Palſies, Convulſions, Lethargy, Numbneſs, Night-mare or Cramps, make this their Beverage, ſince it both relaxes the nervous Syſtem more, increaſes the Viſcidity of the Blood, and Penury of Spirits. Nor is it proper for them that are Goutiſh; or have arthritick Pains, (except from Acrimony of the Blood) becauſe its Viſcidities added to thoſe of the Blood, muſt exaſperate the Diſtemper. All intermittent Fevers and Agues forbid the Uſe of this Liquor; but the Apples of which it is made, ſuch as *Kentiſh* and Golden Pippins, are an excellent Pectoral, eaſe tickling Coughs from a Sharpneſs of the Blood, and relieve Aſthma's from Acrimony of the Juices, or Conſtriction of the Lungs; they are exceeding good in Conſumptions, a fine Cordial, open the Body gently, and cool pleaſantly, and are of great Service in hot, and dry, ſcorbutick, or ſplenetick Habits.

Rough Cyder is made of wild, harſh, or bitter Field Apples; theſe contain a deal of eſſential Salts, which break and attenuate the oily Parts in the Fermentation, by their inteſtine Motion and Colliſions, they grind down one another into ſmaller Particles, rub off their viſcid Coats, and ſeparate the Coheſions of the viſcous Part of the Liquor, ſo that the whole is more intimately mixed: This Cyder is therefore of a ſtrong, pungent, ſtiptick vinous Taſte, will keep longer, and is of more general Uſe and Benefit than the other; when fine, well purified, of a good Colour, and not lower'd with Water, it is better for Health than Wine, if moderately drunk: It is certainly preferable to the ſtrong, heavy, luſcious *Portugal* and *Spaniſh* Wines, which are but half fermented, and approaches near the Nature of *French* Claret. Nay, *Lemery* himſelf owns it *to be more healthful, becauſe its Spirits are not impetuous, nor ſo much agitated as thoſe of Wine, beſides they are detained and moderated by a great Quantity of viſcous Flegm, which ſtill contributes to make this Liquor moiſtening and cooling.* The great Plenty of Tartar contained in this Cyder, renders it an excellent Stomachick; it dilutes and waſhes off the Slime, which adheres, like Glue, to the inner Coats, contracts and ſtrenghtens the pall'd and relax'd Fibres of the Stomach, and gives a briſker Appetite and better Digeſtion; it is therefore a proper Liquor to be uſed againſt Belching, Stuffing at the Stomach, Nauſea, or Vomitings, and for inappetent Women that are breeding. It is of admirable Service in all Looſeneſſes, Fluxes of the Belly, and immoderate Evacuations by Stool, becauſe it cleanſes and ſtrengthens the Bowels, draws up their muſcular Fibres, and contracts their relaxed weeping Glands; its Plenty of Tartar breaks and ſeparates that Mucus which fills up or ſtraitens the Mouths of the lacteal Veſſels, and cauſes a Lientery, or diſcharge by Stool of the Chyle like Milk, together with the *Fæces.* It not only ſcours off the Slime from the inſides of the Lacteals, which occaſions a Toughneſs of the Chyle, but gently ſtimulates and invigorates theſe Veſſels, and increaſes their Action and Force, ſo as to attenuate and prepare the Chyle much better before it be pour'd into and mix'd with the Blood. Being pungent and tart, it both ſcours and contracts the dilated Glands of the Throat and Trachea, and is therefore uſeful in Rheums and Catarrhs. Its a proper Drink for ſuch as are troubled with white Swellings; and where the Breaſt is ſtuffed with thick Flegm, and the Veſſels inactive or weak, it ſerves well to pump it up. Its Spirits being entangled by a viſcous Flegm, and its Tartar plentiful and ſolid, it cleanſes the Kidneys, Ureters and Bladder of Sand, ſmall Stones, Slime and all gravelly Matter, which are only the Product of relaxed Kidneys, which ſtrain off, or let paſs thro' their excretory Ducts too large a Quantity of Salt and Earth, but wanting Strength and Motion to ſhake off, and ſend it to the Bladder, they give it a peaceable Lodging in the Pelvis, till the Earth and Salts attract, and are cemented with a Viſcus or Slime, which is the firſt Embryo of a Stone. As it ſtrengthens the whole ſolid Syſtem, invigorates the Fibres, which give a briſker Motion to the Fluids, whereby they are attenuated and mixed, made to paſs the ſundry Secretions, and fitted for Evacuations, it is certainly a noble Prevention of the Gout, and all arthritick Pains, which ariſe from a Thickneſs and Unfitneſs of the Humours for Motion, or a Sluggiſhneſs, Weakneſs, and Laxneſs of the Veſſels. In intermitting Fevers, Agues, and other periodick, or erratick Diſeaſes, which ſpring from a Sizineſs of the Juices, and an Inactivity or Indiſpoſition of the Veſſels and Fibres for Motion and Action, this Cyder is a moſt agreeable Liquor; for it both thins the Blood, attenuates the ſlimy Juice in the Capillaries, and ſtimulates their Channels. In Rheums and Diſtillations on the Eyes, involuntary Tears, Dimneſs of Sight, from the Thickneſs of the nervous Juice, or Weakneſs of the Nerves, it is very proper Drink for common Uſe: As alſo in Lethargies, Palſies, Apoplexies, Convulſions and Coma's its highly ſerviceable. And in Hyſterick Diſorders, this, or *French* Wine challenge the Preference of all other Liquors. In Corpulency, Cachexy, Leucophlegmatia, and Dropſies, it is of ſignal Service, if moderately uſed for ordinary Drink, becauſe it thins the Blood, excites the Fibres and Veſſels to Motion, accelerates Circulation, promotes Digeſtion, Secretion and Evacuation, eſpecially Perſpiration; and as it frees the contorted

Glands and weak Veſſels of their obſtructing Slime, it alſo ſtimulates and contracts the dilated, lax and inactive Veſicles. And for theſe Reaſons, Phlegmatick Conſtitutions, ſtudious, inactive and valetudinary Perſons cannot have a better Vehicle. Sanguine Temperaments will find it very ſerviceable, if moderately drank; and the Melancholy will reap much Benefit from it, becauſe it gently ſtimulates, dilutes much, and does not quickly exhale or ſend off its Spirits; as for thoſe who are much afflicted with the depreſſing Paſſions, they can have nothing better ſubſtituted in the room of *Champain* or *Burgundy*. Thus far of the Virtues of fine rough Cyder, well made, and long kept.

But as there is no Liquor which has not its bad Effects in ſome Caſes and Conſtitutions, or is not ſometimes prejudicial, ſo this is hurtful, if drank too new; it cauſes Flatulency in the lower Belly, from the Rarefaction and Attenuation of that groſs Air which was ſhut up in the Viſcidity of the Liquor; hence cholick Pains, Gripes and Coſtiveneſs; and from the abundance of its Viſcidity, it fouls the Glands, begets Obſtruction in the ſmaller Veſſels, from whence ſeveral Diſeaſes take their Birth. Theſe Viſcoſities cleave to the Coats of the Stomach and Guts, lie between them and the Food, weaken Digeſtion, pall theſe *Viſcera*, occaſion an imperfect Chylification, and leave many groſs, cold, and flegmatick Humours there, or ſend up ſome with the Blood to the Brain, and ſo beget nervous Diſorders, or a Stupidity; if ſent to the Liver, Obſtructions and Jaundice enſue; if lodged in the Lymphaticks, Leucoplegmatias, and Dropſies follow; if they fall and ſettle on the Lungs, Stuffings, Hoarſeneſs, and Shortneſs of Breath firſt, then a tearing Cough, and a difficult Expectoration of a Viſcid comes on. And when this Cyder arrives at its Maturity, it is by no Means a nouriſhing Liquor for the mechanick and hard Labourer; becauſe it conſiſts of ſharp tartarous Parts, which, together with the Action of the Muſcles, attenuate and expel the finer and more nutritious Parts of the Blood too ſpeedily. For the ſame Reaſon it ſhou'd be refrain'd in a Strangury, and its Uſe forbidden when the elevating Paſſions have fixt their Symptoms on us, ſuch as Tremblings, too great Perſpiration and Evacuation by Urine; then it increaſes the Contraction of the Nerves; but if lower'd with Water its an admirable Liquor in this Caſe, becauſe weak Nerves ſoon fall back and languiſh after the Fit of Paſſion is over, and any viſcid Draught is apt to pall them, and generate Obſtructions in the weak Tubes; but the Tartar and ſtiptick Taſte of the Liquor gives them a Pungency, and preſerves their Tone and Vigour. Very thin and meagre Habits ſhou'd not indulge the free and frequent Uſe of it; becauſe its ſolid Parts abrade the Veſſels, contract their Fibres more, and ſo keep, or make them leaner ſtill. Such as are in an Atrophy ſhould abſtain from it; and ſuch as live low, uſe much Abſtinence, faſting or mean Diet, becauſe it very powerfully promotes Digeſtion, Secretion and Evacuation. Neither is it adviſeable in tickling Coughs, from a Saltneſs of the Humours, or Thinneſs and Acrimony of the Blood: In a Word, as its Uſe is highly ſerviceable in too great a Weakneſs, or Relaxation of the Fibres and Veſſels, and too much Viſcidity, Thickneſs, or undue Mixture of the Fluids, ſo its continued Uſe is hurtful where the Fibres and Veſſels are too much contracted, ſtiff and ſtrong, becauſe it increaſes their Elaſticity, or where the Blood is too much attenuated, and Perſpiration immoderate.

Beſides theſe we have treated of, there is another Sort of Cyder, which is ſour, not thro' Age, hot Weather, or Accident, but from the Tartneſs of the Apples it is drawn from. This has a very ſenſible Acidity in it; and as all Acids cool much, ſtimulate ſtrongly, and increaſe the Contraction of the Fibres and Veſſels, therefore this Liquor is good for ſuch as are troubled with an overflowing of the Gall; of Service in Gripes, Looſeneſſes, froathy, black, and fetid Stools, occaſioned from much Bile; and in all Caſes where an alcaline Acrimony is predominant in the Blood. It quenches Thirſt, is a great Thinner of groſs ſlimy Humours, and therefore very proper for corpulent phlegmatick Habits, to clean their Veſſels, ſcour their Glands, prevent or remove Obſtructions, glandular Swellings, and lymphatick Diſtentions. In hot, cholerick Conſtitutions, (if not very thin and lean) it cools and refreſhes much, and is a palatable Drink. It ſtops bilious Vomitings, cures ſtinking Belchings and Indigeſtion, by ſtrengthening the Stomach, bracing its Fibres, waſhing down its palling Slime, and contracting the dilated Strainers of the Liver. It is proper in intermitting Fevers and Agues, ariſing from the Groſſneſs and Viſcidity of the Blood, the Inactivity, Weakneſs, and Laxneſs of the Solids; the laſt is hereby briſkly ſtimulated and excited to Motion, the firſt attenuated, its ſundry Coheſions broken, and the whole Maſs made more fit for Motion and Nutrition. In Inflammations and inflammatory Fevers it is a proper Liquor, if mixed with a little Water. In an Itch, Scurvy, or Leproſy, ariſing either from an alcaline or oily Acrimony of the Blood, there cannot be a better Liquor drank, for it powerfully checks both theſe, and very much cools the whole Maſs. In arthritick and rheumatick Pains, from too great Thinneſs and Sharpneſs of the Blood and Juices, it is of ſingular Service; and to ſuch as are liable to Hæmorrhages, its Uſe is adviſeable, becauſe it puts a Check to the Blood, which occaſions its increaſed Velocity and impetuous Force againſt the Veſſels, ſtimulates and contracts the ſmall ſanguiferous Tubes, and checks or prevents the too great Rarefaction of the Air in the Blood. But the exceeding Harſhneſs of this Liquor makes it injurious to very thin Bodies, and unadviſeable in all Acidities of the Blood, which are diſcoverable from a ſour Taſte in the Mouth, ſour Belchings, gnawing Pain in the Stomach, *&c.* for it increaſes that Sharpneſs: In all great Conſtrictions of the Solids, it ſtimulates and adds to the contraction or criſping of the Fibres. In an Atrophy, it promotes and increaſes the Waſte; and to hard Labourers, and ſuch as uſe much Exerciſe, or feed on low mean Diet, it is a hurtful Liquor.

There is yet another ſort of Cyder that is inſipid, or has only a watry Taſte, which is owing to the Prevalence of Water in the Fruit, far beyond the other Principles; either from the too luxurious State of the Plant, or from its being planted too deep in the Earth, its ſtanding ſhaded from the Heat of the Sun, or from a cold wet Seaſon; in all theſe Caſes the Fruit is crude and watry, and never comes to that Perfection which a due Proportion of eſſential Salt and Oil would bring it to. This is the worſt of all Cyder, highly pernicious to the flegmatick, aged, ſtudious, and valetudinary, for it abounds with Viſcidities, which render the Blood ſizy, and diſpoſe the Body for many Obſtructions, Swellings, Dropſies, Cachexies, Scrophula's, *&c.* It is only fit for quenching the Thirſt of hard Labourers, Mechanicks, and ſuch as uſe much Exerciſe, and theſe muſt uſe it ſparingly, or expect to ſmart for it.

A Jack of Brandy mixed with a Bottle of Cyder, when its decanted is frequent in ſeveral Places, but Brandy is a needleſs Addition to rough Cyder; ſweet Cyder is much better'd by it, and inſipid Cyder highly requires it, before we can drink any Quantity of it with Safety, for above one half of the beſt Brandy being an inflammable Spirit (which will all burn away) that's only eſſential Salt and Oil; this ſubtile, volatile Salt added to that of Cyder, helps to deſtroy its Viſcidity, and makes the Separation of its Coheſions and Digeſtion in the Body much eaſier, prevents that Flatulency, Belchings, Gripes, and cholical Pains, Sleepineſs and Dulneſs, Pain at the Stomach and Indigeſtion, which Cyder alone produces ſometimes; it is no leſs uſeful to hinder Obſtructions in the Veſſels and Glands, Sizineſs of the Blood, Relaxation of the ſmall Veſſels, Corpulency and other Diſorders which ſweet and inſipid Cyder are apt to cauſe, it is an admirable good Liquor for old Men, and will agree with moſt Ages, Conſtitutions, Climates and Sex, but Brandy makes it leſs nouriſhing and ſtrengthening to Mechanicks, becauſe it haſtens the Diſſipation of its fineſt Parts; inſipid Cyder, with a little Brandy, becomes a very wholſome Liquor. The Weak, Valetudinary, Studious, Idle, Corpulent, or Cachectic, ſhould refrain Cyder, produc'd in a very wet and cold Summer, unleſs they mix Brandy with it, and then it will be ſerviceable and wholeſome for them.

Pears contain much Earth, Oil, and eſſential Salt, beſides their Phlegm, whereby they ſtrengthen the Stomach, create an Appetite, and are aſtringent; of them a Liquor is made call'd Perry, which I ſhall here conſider, it is much of the ſame Nature of Cyder; it differs alſo in Reſpect of its Taſte, Age, and making; it differs in Taſte, according to the Fruit of which it was made, whether that was ſweet, ſour, harſh, inſipid, or of mix'd Taſtes. 2. According to the Degree, Perfection, or Imperfection of its Fermentation; by theſe you may find out its Properties in the ſame Manner as thoſe of Cyder, which I diſcuſs'd at large. Perry muſt not be drank before it be fine, becauſe its viſcid Parts have not ſubſided, therefore it weakens the Stomach, palls the Appetite, cauſes Flatulency, Gripes, and cholical Pains, the Spirits alſo which ſhou'd promote Digeſtion, invigorate the Veſſels, and actuate the Liquor, are entangled and wrapt up in a groſs Phelgm or Viſcoſity; but when the Liquor has ſtood a due Time upon its *Fæces*, the groſs, earthy Particles attract one another, and form larger Corpuſcles than the Body of the Liquor in a State of Reſt can ſupport, or carry up any longer, but they fall to the Bottom and Sides of the Caſk, where partly by the ſtronger Attraction of theſe groſs earthy Coheſions, partly from the Subtility of the Spirits themſelves, and their Diſpoſition to Motion, they are extricated from the *Fæces*, ſet at Liberty, and go into the Liquor again. Then is the proper time either to drink it, or draw it off into Bottles, for if it ſtands much longer, the Spirits are either abſorb'd by the Caſk, or exhale and leave the Perry vapid and dead, after which it ſoon becomes ropy and mothery; or if the Spirits be again united to the Salts, it is ſpiritleſs, and turns ſour and undrinkable; of all Perry, that which had Water mix'd with it when it was made, ſpoils the ſooneſt, and fines the leaſt. Perry, becauſe of its Tartneſs when fine, ſtrengthens the Stomach and Bowels much, and is therefore a good Aſtringent or Binder, it waſhes off the Slime and *Mucus* from the Inſide of the Inteſtines, opens the Paſſage to the Mouths of the Lacteals, clears them from all *Mucus*, or ſlimy Furring, invigorates their conſtituting Membranes and Fibres, ſcours the contorted Tubes of the Glands, unloads them of their adheſive and oppreſſing Viſcidities, by ſtimulating, invigorating, and exciting the delicate Veſſels to caſt it off. 2. By the Solidity and Dryneſs of its earthy or ſaline Parts, which add a freſh *Momentum* to the Blood, and incide, break, ſeparate, and divide its viſcid Combinations. 3. By carrying into the Blood a Sufficiency of Phlegm or Water to dilute it and facilitate the Action of both Veſſels and ſaline Particles. Perry is the beſt Liquor can be drunk after a Surfeit of Muſhromes, eſpecially if a Dram of Brandy be added to it, then it is reckoned a better Antidote than either Wine or Honey, both which contain a very fine Oil, ſubtilized to a Spirit, which entangles the acid, volatile, coagulating, and malignant Salts of the Muſhromes, and the delicate eſſential Salts of the Liquor, penetrate, ſeparate, attenuate, and divide its tenacious ſpongy Parts, which two, *viz* the acid and coagulating Salts, and the ſpongy tough Subſtances, paſſing together with the Chyle into the Blood, and getting into the ſmall Veſſels of the Lungs, ſtuff and diſtend them with both a tough, coagulated, and malignant Blood, which occaſion Suffocation, Strangulation, and Death; hence thoſe Muſhromes which have the leaſt Salt and moſt Oil are the leaſt dangerous, for the laſt fetters up and entangles the firſt, ſo as it is not ſo volatile, ſeparable, and miſchievous as it would otherwiſe prove; *è contra*, the more Salt and leſs Oil, the more dangerous; therefore ſuch as degenerate from their natural Colour after they are waſhed, and become Blue or Black, are the moſt fatal, becauſe they contain the moſt acid coagulating Salt. It is from the Redundancy of this Salt in them, that if they be let lye ſome Days after they are gathered, before they be dreſſed and pickled they undergo a Kind of Fermentation, wherein their Salts which were bound up in their viſcous and ſpongy Parts, ſlowly and inſenſibly extricate and free themſelves, ſhake off their Fetters, take to them their full Forces, and become a Poiſon; but whilſt the Salts were cloſely tyed to the Oil and Sponge, were leſs dangerous; therefore Muſhromes brought up on Dung Beds having much Sulphur in them are more ſafe than others. It is for theſe Reaſons that *Dioſcorides* divides them into two Claſſes, one whereof he ranks among the Number of Poiſons; and *Pliny* is highly diſpleaſed with the Luxury of Mankind who will gratify their Palate

late in the eating of them at the Peril of their Lives. *Nero* called them the Food of the Gods, becauſe his Predeceſſor *Claudius*, who died with eating of them, was deified. And *Lemery* ſays they are a Sort of Victuals we cannot be too cautious of, ſeeing the beſt of them are ſometimes pernicious, and every Day whole Families are brought to their End by eating of them. Perry is made after the ſame Manner, and has near the ſame Properties as Cyder; the beſt is that made of tart or harſh Pears; it has a Colour and Taſte like *Rheniſh* Wine, and has much the ſame Vertues as rough Cyder, but Perry is the more pleaſant, and revives and refreſhes more, is very diuretick, cools much, and is therefore very injurious to ſuch as labour under flatulent Cholicks, Obſtructions of the Liver, Pancreas or Meſentery of a ſchirrous Nature. Either Cyder or Perry have their Virtues highly exalted, their Viſcidities much broken and rendered much better for Uſe, if Sugar, Nutmeg, and Ginger be put up with them, theſe prevent their Crudity and Flatulency.

I have diſcourſed at more length upon Cyder, becauſe, next to Malt Liquors, it is the chief Product of our Iſle, and a Drink that is moſt uſed in ſeveral Weſtern Countries in *England*, and often called for in hot Weather over all *Britain*.

Of MEAD, METHLEGIN, and HYDROMEL.

THESE Liquors are much uſed in the northern Countries where great Cold hinders the Growth of the Grape and Production of Wine; but kind Nature has bountifully provided them with Honey, which they make into a ſpirituous Liquor with Water, and eſteem it as much, yea ſome prefer it before Wine; all theſe three are made with Honey and Water, and ſome Aromaticks, as Cinnamon, Ginger, Nutmegs, Cloves, *&c.* and fermented with Yeſt after boyling; the laſt is only Honey and Water boyled and barrelled cloſe up without Fermentation. Theſe are the chief Drink of *Ruſſia*, *Muſcovy*, *Lithuania*, and *Tartary*, and ſeveral good Houſewives in *Britain* prepare and keep them yearly. Fermented Mead having the eſſential Oil and Salts of the Flowers from which it is gathered, broken, mixed with the Water, and reduced to ſubtile, volatile Spirit, becomes of the Nature of Wine when it is kept to a right Age, *i. e.* till it be clear, fine, and of a pleaſant vinous Taſte, which if right made, it muſt be, conſidering that Honey is only the moſt eſſential, ſubtile, and fine Parts of Flowers, and for this Reaſon Mead muſt be a very wholeſome Liquor, becauſe it is a curious and chimical Collection of the beſt Principles of aromatic and cordial Flowers. Mead muſt be an excellent nervous Wine, increaſe the animal Spirits, and inflate the delicate Tubes with its volatile and exalted Parts, fit them better for vigorous Motion and Action; and as it affords plenty of nervous Juices that will ſupply the Nerves of involuntary Motion, ſtrengthen the Heart, promote Circulation, and prove a great Cordial, far beyond Brandy, *Aqua vitæ*, or *French* Wine, becauſe their Spirits being ſtripped of their mucous Phlegm and left naked, they ſoon exhale and leave their Phlegm to thicken the Blood, load the Veſſels and weaken the Fibres, but the Spirits of Mead and Methlegin, being ſtill more wrapt up in the oily Parts, continue longer in the Body, invigorate the Solids, and keep them longer in Play. *French* Wine indeed has this Advantage, that it abounding with Tartar, that Tartar gives a greater ſtimulus to the Veſſels, and by its roughneſs corrugates and draws up the Fibres more, whereby they become ſtronger, and keep their Tone longer, even when its Spirits are ſpent. It alſo abounds more with ſubtile fine earthy Parts, which nouriſhes and makes up the Waſte and Abraſions of the Veſſels. For theſe Reaſons Mead approaches nearer the Nature of *Spaniſh* and *Portugal* Wines, only it has leſs Earth, and their Earth is too groſs to anſwer the End of true Nutrition. Mead is excellent in all Languiſhings and Decays of Nature; it is a Milk for old People, a great Strengthener of the Solids of the Phlegmatic, an Attenuater of the Blood, an Invigorater of the loaded abdominal Veſſels, and a powerful Reviver of the Spirits of melancholy Perſons; as Cyder is chiefly adapted for Summer Service, ſo is this for Winter Uſes; as Cyder is to be drunk with Meals, and as an Afternoon cheering Glaſs, ſo this anſwers beſt a morning Whet. It is a powerful Diuretick; cleanſes Kidneys, Ureters, and Bladder of all ſandy, ſabulous, mucilaginous, gravely and exotic, tardy Bodies: As it affords Plenty of animal Spirits which invigorate the Nerves and Fibres, they attenuate, mix, and prepare the Blood for Secretion and Excretion, by this Property, and its Multitude of eſſential Salts, it ſcours the Glands and Lymphatics, cleanſes away the Viſcidities of the Blood; it fortifies the Stomach and promotes Digeſtion in the Bowels, by its gently ſtimulating the muſcular Fibres, attenuates the Viſcidities lodged in the Glands, and affords nervous Juice. But Hydromel, that is, Honey and Water boil'd, and kept unfermented, with Cinnamon, Ginger, and Nutmegs, is a powerful Cleanſer of the Lungs; it helps Expectoration, and ſheaths the ſharp prickling Salts which tickle the trachæal Glands, for it not having undergone Fermentation, abounds with many, oily Parts and Salts, which not being ſo minute and ſubtile as in the other, prick not, nor ſtimulate the Nerves and Glands, neither are the oily Parts ſo groſs as to cloy and load the ſmall Veſſels of the Lungs, but ſoften and ſmooth them, ſheath the ſharp irritating Salts, and ſmooths the Inſides of the Veſſels with a noble balſamic *Litus*, which defends them from Pungency and Irritation, till they recover Strength and Elaſticity, whereby they ſhake off and propel any viſcid or ſaline Moiſture which might ſtuff, load, or tickle them. Thus is Honey and Mead of unſpeakable Service to the Diſeaſes of the Breaſt. And alſo where the Bowels are ſluggiſh and inactive, and do not anſwer, or where they are too dry and ſtiff, want glandular Moiſture to expedite the Paſſage of the *Fæces*, this Mead is good, becauſe its groſs Salts prick and ſtir up the Inteſtines to their Office, or its groſs Oil lubricates and ſoftens them, cauſes the Glands to give Way to the Impulſe of the circulating Blood, and their excretory Ducts are ſoftened and widened; hence a larger Quantity of inteſtinal glandular Juice, whereby Stool is provoked. But vinous Mead has not this Effect, becauſe the Fermentation has ſubtilized its Oil and Salts ſo much, that they readily get through the firſt Paſſages into the Blood, without producing that Effect. The *OEnomeli (i. e.* Wine and Honey mixed) of the Antients, will ſtill make the Wine more pectoral, *i. e.* the Oil and viſcid Parts of the Honey will obtund, or ſheath up the Tartar of the Wine ſo as it will not prick nor tickle the Glands of the Throat, to excite a troubleſome Cough; the Wine on the other Hand will make the Honey more cordial ſtomachic, and of quicker Digeſtion.

Mead and all Preparations of Honey are moſt diſagreeable to choleric Conſtitutions, becauſe it ſoon degenerates into the Nature of Bile, cauſes terrible Gripes, bilious Cholicks, and not ſeldom Death; it is alſo hurtful in ardent Fevers, becauſe its Spirits will increaſe the violent and impetuous Motion of the Humours, and exaſperate the Diſeaſe. It is no leſs unſuitable for hot Summer Weather, becauſe then the Solids are lax, Digeſtion ſlow, and it lying on the Stomach meets with the Biles and turns into an Acid, which preſently raiſes a violent Cholick, ſo that as Cyder is adapted for Summer, ſo is this for Winter. Mead drunk before it be fine, palls the Stomach, goes ſlowly off, cauſes Belchings, Flatulency, Indigeſtion, *Nauſea* and Vomiting, from the Viſcidity it had not yet depoſited, wherein the contained Air rarefies, expands, and cauſes an Exploſion, and theſe Viſcidities meeting with the Bile, eaſily turn into the ſame, and ſo cauſe bilious Vomiting, Pain in the Bowels and Looſeneſs; and becauſe it contains both much Spirit and viſcous Parts, it eaſily cauſes Drunkenneſs, hard to get off.

Of BIRCH WINE, GOOS-BERRY WINE, COWSLIP and ORANGE WINES.

BIRCH Wine has long Time deſervedly obtained and retained its Character in the World, for it is full of a very delicate Salt or Tartar mixed with a very thin Phlegm, has little of that Viſcidity in it which makes all other made Wines ſo flatulent and unwholeſome; it is of the Nature of *Rheniſh* Wines, its ſolid naked Tartar or Salts make it highly ſerviceable in ſeveral obſtinate Diſorders, as, in any Loading, Stuffing, or Infarction of the renal excretory Veſſels, or Lodgments of ſmall Stones, Gravel, Sand, or Slime; it dilutes the lodged Matter, increaſes the Quantity of Urine, ſtimulates and invigorates the Veſſels to ſhake them off, diſlodge and expell them, and ſo cleanſes and clears the Channels, and frees the Drinker from much Pain; becauſe of the Minuteneſs and Solidity of its Salts, and Thinneſs of their Vehicle, it dilutes a ſizy Maſs of Blood, diſſolves its viſcid Coagulums, waſhes off the Slime and *Mucus* from the Inſides of the Veſſels, clears off Obſtructions from the Glands, opens the obſtructed Channels, and adds a freſh *Momentum* to the Blood; and becauſe its Salts ſtimulate the Veſſels, and alſo its Spirits afford Juice to the nervous Tubes, the Solids are invigorated, ſtrengthened, and act with more Force and Briſkneſs over the Fluids, whereby the laſt are attenuated, mixed, fitted for Secretion, Excretion, Nutrition, and Evacuation. And as it both irritates and raiſes the Solids, diſſolves and mixes the Fluids, ſcours the Glands, and provokes Urine, it comes in good Play againſt Dropſies, Cachexies, an indolent and bulky Habit of Body. When the Blood is ſizy, ſluggiſh, and inactive, and the Lungs unable to repeal its Settlement, and loading their ſlender Tubes with a thick, viſcid Phlegm, either in the tracheal or pulmonary Veſſels; the firſt cauſing a Cough, and difficult Expectoration of a thick, tough Phlegm; the ſecond a Diſtention, Dilatation, and invincible Load of ſizy Blood, diſpoſing the Lungs to Tubercles, Hydatides, or Impoſtumation; the Tartar of this Wine cuts, ſeparates, and diſſolves theſe Viſcoſities, excites the Veſſels to put forth a great Force, Action, and Elaſticity, and at the ſame Time its pure Phlegm dilutes the Blood, thins the Humours, and diſpoſes them to be thrown back into the Veſſels and Blood, till they be reduced to a ſubtile Matter fit for Perſpiration, or Evacuation by Urine, and then they are expelled and the phthiſical Perſon reſtored; for this Purpoſe it excells *French* Claret (tho' the thinneſt of all red Wines) becauſe the laſt has too great a Reſtringency or Stipticity in it, whereby it contracts the Veſſels, makes them narrower, and ſhortens their Diameters, as the viſcid Coheſions are rather wedg'd in, and the Diſeaſe made worſe. It exceeds white Wine alſo, for this has too much and too naked Tartar, which ſheares, abrades, and waſtes the Veſſels, till it bring the Body into a Cachexy. But of all Birch Wine, that is beſt for this Purpoſe which has a Quart of Honey added to each Gallon of Juice. As Birch Wine is a great Diuretick, it is very ſerviceable in a Strangury, or partial Obſtruction of Urine from a Viſcidity of the Blood, or Infarction of the Parts, becauſe it clears the Paſſages, removes the obſtructing Cauſes, and brings off Urine freely. It is of good Uſe in ſcorbutick Habits, contracted by Intemperance, an unequal Mixture or Sizineſs of the Blood for theſe Reaſons. It is alſo a good Gargle for tumefied Tonſils or Glands of the Mouth, cauſes Spitting and Diſcharge of much ropy Phlegm. In a Word, it is the moſt inoffenſive and truely uſeful of all our factitious Wines.

But ſeeing it is ſo powerful a Diuretick, Thinner of the Blood, and Promoter thereby of Perſpiration, it is injurious to very thin, lean, and hectic Bodies, becauſe it promotes a Waſte and Atrophy too much. Neither is it to be uſed in a Strangury from the Saltneſs and Sharpneſs of the Blood cauſing an Inflammation of the Parts, and Heat and Scalding of Urine; for all Diureticks ſtimulate thoſe Parts, encreaſe the Afflux of Blood to them, and exaſperate the Symptoms. It muſt alſo be refrained in a *Diabetes*, ſeeing it is neither reſtringent, anodyne, nor balſamic, and ſo cannot thicken the Juices, nor contract the Strainers. An immoderate Flux of the *Menſes* forbids its Uſe, ſeeing it ſtimulates the Parts, thins the Blood, and promotes the Evacuation. Too keen an Appetite calls for greater Blunters, and not ſuch a briſk Fortifier of the Stomach. Too great a Fluidity or impetuous Motion of the Blood make its Uſe ſuſpected, as promoting both theſe. Too much Labour, Exerciſe, or Evacuations render its Uſe hurtful, becauſe it is too thin, and ſtimulating, and depauperates the Body too ſpeedily of its nutritive Juices. Too low a Diet, except of tenacious Foods, agrees not with this Drink. Gooſberries contain very much eſſential Oil and fine Salt, beſides their Phlegm therefore affords a good Wine and the beſt Brandy our Iſland makes. This Fruit when green, abounds with acid Salt and much Earth, which give them that ſour, ſtiptick Taſte, and make them pungent on the Tongue, but as they ripen, the Oil abounds more, unites with and ſheaths their Salts, then are they leſs aſtringent, more viſcid, have a better Taſte and turn ſweet. Gooſberry Wine made of the Berries before they be full ripe, well fermented, and kept ſeveral Months till it is clear and fine, is a moſt delicious, cooling Summer's Draught adapted eſpecially to young Perſons, and the bilious (and ſanguine) whoſe Bodies from the Thinneſs, Equality, and rapid Motion of their Blood and Force of their Solids are eaſily over-heated, and too great Waſte by Perſpiration promoted. From the Abundance of its Salts and Oil it becomes very ſpirituous; but its Salts being a little acid, it is tart, and thereby pricks the Stomach, promotes Digeſtion, helps Nauſea, Belchings and Vomitings; for the ſame Reaſon, it purſes up the pall'd and too much relax'd Solids of the Body, invigorates the Force of the Fibres, keeps the Blood in better Play and Mixture, prevents its running into viſcid or grumous Coheſions, or being too profuſely perſpired through the relax'd Skin; and mix'd with Water it makes a very agreeable, ſharp Drink in ardent Fevers, eſpecially where an alcaline Acrimony prevails in the Blood. It quenches Thirſt, and where the Blood is too fluid, or rarefied, it checks its Rarefactions, and gives it a better Conſiſtence, or the Juice of the unripe Fruit mix'd with Water or boil'd in Drink, ſtops a Looſeneſs in Fevers, and is a great Aſtringent in ſpitting of Blood; it is alſo good in putrid Fevers, or where there is a Tendency of the Parts to a Mortification: It is no leſs ſerviceable againſt ſuch Poiſons as rarefy the Blood, relax, dilate, and diſtend the Veſſels beyond their due Tone, as Poppies, Opium, *&c.* or for ſuch Poiſons as leave a Viſcidity, or render the Juices tenacious, and ſtupify, as Hemlock, Henbane, *&c.*

But, both Berries, Wine, and Decoction, are injurious to the Melancholick, becauſeof their Acidity and Stipticity, which corrugate their Fibres, and thi ckentheir Blood; they are alſo diſagreeable to ſuch as have a gnawing, corroding Pain at their Stomach, from an acid Humour too plentifully pour'd in, or ſkulking there; they are apt to raiſe a ſevere Cholick, where they are uſed by thoſe who have an Acidity of Humours in their Bowels, or where the Blood is too acid, they thicken it more.

Currants have little Oil, but much Salt and Phlegm in them; they afford a Wine, that, when it has been bottled two or three Months, is of a good Body, delicious Taſte, a beautiful ruby Colour, and rich. It is a delicious cooling, moiſtening Drink in Summer, and by its Tartneſs it corrugates the muſcular Fibres of the Stomach, and helps Digeſtion; its Salts make it a good Detergent, (if not overloaded with Sugar, or ill fermented, or drank before it be fin'd) it purſes up the relax'd Fibres in very hot Weather, and checks too great a Perſpiration; or if the excretory Ducts of the Skin be ſo pall'd, that they cannot expell their contain'd Matter, but its Thickneſs and more viſcid Parts furr up the Channels, it ſtimulates the Fibres, cuts and divides the groſs Humours, and promotes a ſlow Perſpiration. It is good to check the Redundancy of the Bile, by its acid Salts, and by its Reſtringency it contracts the Strainers of the Liver, and makes the Veſſels narrower, ſo as leſs Bile is ſeparated and poured into the Inteſtines, and more of it diſcharg'd with the other Humours by the Skin. It is good alſo againſt an oily Acrimony in the Bowels or Blood, nidrous Stinking, oily Belchings and Loathings. It is proper in a Fullneſs and Stuffing at Stomach, and a Weakneſs and Laxneſs of the Bowels. A moderate Glaſs of that which is old, ſtrong and fine, agrees with phlegmatick, unweildy Bodies, becauſe of its Plenty of Salts. It is no leſs uſeful to the Cholerick, as its Fluidity mixes with, and corrects the Bile, and prevents the too great Acidity and Rarefaction of the Blood, for the ſame Reaſon it is good after Laudanum, Opium, or too great a Doſe of Poppyſeeds, or any ſtupifying Poiſons. It is a proper Drink in a foggy, cloſe, ſultry, hot Weather; it is chiefly adapted to Youthhood.

Melancholy Tempers cannot ſo well bear it, for the ſame Reaſon that Goosberry Wine diſagrees with them; neither is it eligible in cold Weather, becauſe it chills too much, and as it cools, moiſtens greatly; old Age ſhould not uſe it, for their Circulation and Heat is languid, and their Perſpiration anſwerable. In Pains of Stomach or Bowels from an acid Humour, it is hurtful, being full of acid Salts; and all Diſorders from Acidity of the Blood are encreaſed by it; therefore arthritick or rheumatic Pains from a Sharpneſs of the Blood, are exaſperated from its Uſe. And Diſeaſes ariſing from a Thickneſs of the Blood forbid its Uſe.

Cowſlip Wine has a grateful enough Taſte; it is cooling from the Lemons added to it; it is a proper Draught for the Summer Time; it is alſo good in great Anxiety, Reſtleſſneſs, and Toſſings, being of a ſoporific Nature, and gently compoſes to Sleep. It's alſo a little detergent, and promotes Expectoration, ſomewhat cordial and a little ſtomatick, the laſt is owing only to the Lemons. But it is very viſcid,

cid, and therefore occaſions Flatulency in the Bowels, therefore ſuch as are liable to flatulent Cholicks ſhould not meddle with it. If drunk too freely, it taints the Blood with a Viſcidity, which fouls the Glands, furrs the Channels, and begets Obſtructions; the Sugar and Lemon make it a little diuretic; phlegmatic, unwieldy, cachectic, and hydropic Perſons, or ſuch as are liable to Obſtructions of the Glands, and white Swellings ſhould not touch it, both becauſe of its Viſcidity and ſoporific Tendency, which relaxes the Solids, which ſhould be drawn up, ſtrengthened, and invigorated. It is naught for old People, whoſe Juices are already too thick, and their Perſpiration too ſlow; a Foggy Air, rainy Weather, and marſhy or wet Places forbid its Uſe, becauſe it relaxes more, and adds to the Indiſpoſitions ariſing therefrom. Its Uſe is chiefly to pleaſe the Palate at the Expence of running the Venture of ſome bodily Diſorder.

Orange Wine has a pleaſant Taſte, is a leſſer Kind of Cordial, and ſtrengthens the Stomach, by ſtimulating ſoftly, and drawing up its Fibres, and begets a better Appetite. It is chiefly uſeful in a Morning, to waſh off the Slime from the Stomach, raiſe its Tone, and correct the Plenty of Bile; it is ſomewhat diuretic; but this is alſo liable to Viſcidity, and ſo may cauſe Gripes, and cholical Complaints, both from its Coolneſs and Viſcidity, is therefore no ways fitted for a cheering Cup; it is beſt in Summer, or hot and dry Weather, to bilious young People, but not ſuitable to the aged, phlegmatick, and cachectic Conſtitutions.

Elder Wine is another excellent factitious Wine, which muſt not be forgot, for did either my Deſign or Time allow, I could write a whole Book of different Sorts of Wines which might be made from the ſundry Parts of this noble, ſimple, and deſpiſed Shrub, which though the moſt hated, and moſt induſtriouſly rooted out of both Gardens and Fields, is yet the moſt uſeful and medicinal of all others, to human Bodies: Bountiful Nature having provided it as a *Panacea*, which affords Relief to the moſt Diſeaſes we are liable to, and that with little Labour and Expence, which ſhould make us admire it and value it the more. Elder Wine differs in its Properties, according to the Ingredients wherewith it is made. That made with Raiſins of the Sun is more ſharp, thinning, cleanſing, moves the Belly, and opens Obſtructions more; that made with *Malaga* Raiſins, is more healing, pectoral, ſoft, ſmoothing and ſweetning, becauſe they are much fatter, abound with Oil and Balſam. But that made of only the Juice of the Berries, boil'd and ſcumm'd, and Sugar put to it and fermented, barrel'd up, well ſettled, then bottled off, and a ſpoonful of good Brandy put to each Bottle, is the richeſt, ſtrongeſt, and beſt Wine I ever drank; it will keep good many Years, and has the true Virtue of the Elder in it, becauſe it is not chang'd by long and high Fermentation and Diſtillation; for theſe ſeparate and ſubtilize its Spirit, alter its natural Properties, and leave it no other Virtue but what is common to other ſpirituous Liquors, however ſome may boaſt of *Arcana's* to bubble the Ignorant out of their Money. But ſeeing this Wine is moſtly made with Raiſins, I ſhall conſider firſt the Virtues of them, then of the Berries. Raiſins are both ſoftening and adheſive, and have a ſpecial Activity and Diſpoſition to Motion, when join'd with a ſuitable Configuration of Parts; by the firſt of theſe, they thicken the too thin and ſerous Humours, ſoften the ſaline, ſharp, and tickling, check the impetuous Motion of the Blood, from a Sharpneſs, Pungency, Nakedneſs and Multitude of its Salts, which they ſheath, blunt, or abſorb; and by their laſt Property they are poſſeſs'd of ſubtile Parts which are proper to mix with, attenuate and carry away the Contents of Abſceſſes and Ulcers; they alſo abrade and take along with them, thoſe mucous and viſcid Collections of Humours, which adhere to and obſtruct the Veſſels. The firſt of theſe makes them excellent in ſharp troubleſome tickling Coughs, ariſing from too great a Seroſity and Saltneſs of the Blood, becauſe they ſheath up and blunt its Acrimony, make it thicker, of a more equal Temper, and give it an adheſive Quality, whereby it is more nouriſhing, ſoft, and balſamick, and affords a ſoft, oily *Litus* to the naked, or abraded Veſſels, induces a more indolent and pacific State to them, their *Stimulus* being check'd or remov'd; for the ſame Reaſon are they no leſs ſuitable to ſcorbutick Habits, where there is much Acrimony in the Blood diſcover'd by great itching, culticular Eruptions and Eroſions, Tetters, Eriſipelas, *&c.* becauſe they, by ſheathing the Salts, remove the *Stimulus* of the Veſſels, prevent their Abraſion and Conſumption, therefore are they deſervedly reckon'd among the Sweetners of the Blood, and ſuited to lean, thin, hectic, ſcorbutick Bodies. The riſe of a Cough from the Saltneſs; Sharpneſs, and Seroſity of the Blood is eaſily known, from the conſtant, uneaſy Tickling of the Throat, from the Thinneſs of the Spitting, it is alſo often ſharp or ſalt, from the Quickneſs of the Pulſe; from the Liveline ſs and Briſkneſs of the Perſon's Conſtitution; and laſtly from a Roughneſs perceived in the Throat and Breaſt; by this Diſpoſition they are very uſeful in Catarrhs, which come from the Thinneſs and Sharpneſs of the Juices, and their pricking of the Veſſels,

ſels and running ſpeedily through them; for the Secretions are diminiſh'd by an accelerated Circulation, yet as true it is, they are increaſed by the Thinneſs of the Blood, Excoriation or Abraſion of inſides of the Veſſels, and the Briſkneſs of Circulation, attended with a conſtant Irritation of the containing Tubes. Hereby they come in Play for rheumatick or other fix'd or erratic Pains, occaſion'd by the Thinneſs and Saltneſs of the Blood, for by the firſt, its globular Parts being leſs, it enters the ſmaller Veſſels, which being conic, it muſt ſtop, till by their Force it be attenuated; during this Delay, its Salts attract more, and act with a ſtronger *Stimulus* upon the Capillaries, whereby they contract, ſtraiten, and hinder the free and ordinary Circuit of the Blood. Hence an Action of the Blood againſt the Veſſels, and of them againſt the Blood, and of the Parts of the Blood againſt one another, till the thinner Parts eſcape, and the thicker are ſtopt, which is the Cauſe of the Inflammation and Pain of the Parts; but the *Perioſteum* and Membranes about the Joints, having the ſmalleſt Veſſels moſt ſenſible, and leaſt dilatable, they will be the moſt ſenſible, fitteſt, and moſt ſuſceptible of this Miſery. Pains from this Cauſe are diſcoverable from the Signs of a diſſolv'd, ſharp, and ſalt Blood, and alſo by Night Coughs, ſlow Fevers toward Evening, and Defluxions on ſome Parts; becauſe of their temperating and ſweetening the Blood, they are uſeful in Leproſies, Scurff, and Dandriff, of Head or Body; their ſoftening, ſheathing, adheſive, and pacific Quality makes them a fit Ingredient in Venereal Caſes, where the Juices are very ſalt, and the Parts heated, excoriated and pain'd; for the ſame Reaſon they are juſtly join'd to Decoctions, againſt hot Rheums falling down on the Eyes, or a gnawing Pain of the Stomach, from too much acid *Saliva* ſpued out by its Glands, or in Cholicks from acid Salts, pricking, ſtimulating, and inflaming the Inteſtines; but in all theſe Intentions, *Malaga* Raiſins muſt be prefer'd. Raiſins, by their attenuating and deterging Property, are highly neceſſary and uſeful in promoting Expectoration and diſlodging Viſcidities in the *Bronchia*, and cleanſing away the adheſive *Mucus* which lines and loads either tracheal or pulmonary Veſſels, and as they are ſerviceable in attenuating, mixing, throwing back into the Veſſels, and carrying off the ſtuffing or obſtructing Slime or *Mucus* in the Lungs, they act the ſame kind Part to the Kidneys and urinary Paſſages, cleanſe them from Sand, Gravel, Slime, or ſmall Stones, take off alſo that adheſive Viſcidity which furrs up, ſtraitens, or obſtructs the renal ſecretory Paſſages, and ſo prove Diuretick. Hereby they are beneficial in Stuffings, Straitning, or Obſtructions of either hepatick, ſplenetick, pancreatic, or meſenteric Veſſels, where a ſlow and weak Circulation, a tenacious Juice, or a lax Fibre, has caus'd a furring up of the inſides of theſe Veſſels. In an Aſthma, from an Infarction of the Veſſels with thick or tough Phlegm, they attenuate, cut and prepare it for Expectoration, and gently invigorate the Veſſels againſt receiving ſuch a Load; they are alſo good in great Hoarſeneſs from a Load of ſizy Juices upon the tracheal Veſſels; for theſe Reaſons they are greatly profitable in hydropic or cachectic Diſorders, where from the Thickneſs of the *Lympha*, its Indiſpoſition to Motion, and the Weakneſs, Laxneſs, and Diſtention of the Veſſels, the Lymphaticks are burden'd; they are a fitting Ingredient in Meat or Medicine, againſt Collection of Matter, Defluxion or Apoſtemation in any particular Part, or in any great Flux of thick viſcid Matter upon any Ulcer or Sore, which prevents its healing; in antiſcrophulous Intentions they claim a Right of Aſſiſtance; in the *Fluor Albus* they help to ſcour and contract the relax'd Glands and ſweeten the Blood; but in all theſe Intentions we muſt make choiſe of Raiſins of the Sun. Raiſins are injurious to the cholerick; but agree better with the aged, weak, hectic and thin. Elder Berries contain much Oil, ſome volatile Salt, more fix'd Phlegm and Earth; they are more acid than Dwarf-Elderberries; the Juice of the Berries is not only medicinal, but being made into Wine, fermented and kept till it be fined and clear'd, is a delicious Liquor, whoſe Oil and Salts being attenuated and ground down from their groſs *Moleculæ* by its inteſtine Motion of Fermentation, afford much nervous Juice, and animal Spirits; its fine terreſtrious Parts at the ſame time help to ſupply the Waſte of our Bodies ſuſtain'd by Labour, Exerciſe, Watching, or Faſting; its groſs Oil lubricates the Springs of the Fibres, ſupply ſuch as are dry'd and parch'd, or too much contracted, corrugated, or convulſed. It ſheaths, or blunts alſo the Salts of our Blood, when they are too ſharp, naked, or much; or if the Blood be too viſcid, ſizy, or groſs, the Salts in the depurated Wine incide, attenuate and ſeparate its Coheſions, fit it for a briſker, fuller, and more equal and univerſal Circulation, whereby its nutritive Principles are ſeparated and ſet at Liberty, from the groſs and uſeleſs Parts wherein it was entangled, and helps to expel the excrementitious Juices; not only do the Salts cut and divide the groſſer Parts of the Blood, but they add a *Stimulus* to its containing Tubes, whereby they exert and act with greater Force, ſwifter Motion and Elaſticity, which not only adds to the Ballance of the Solids againſt the Fluids, but to the better Mixture of the Blood, and prevents that Attraction of its groſſer Parts, which it always diſcovers in a ſlow Circulation; and to all theſe Advantages of the Earth, Oil, and Salts, the Phlegm adds its Aſſiſtance, being a Vehicle to carry them into the Blood, and promote their Uſefulneſs there. Elder Wine ſuits the thin, lean, hectic, hypp'd, aged, corpulent, cachectic beſt, eſpecially in Winter, cold Weather, or temperate Air; it is leſs agreeable to the Choleric, eſpecially in very hot Weather, leſt it encreaſe the Quantity of Bile, and procure Gripes or bilious Cholicks.

But let us conſider it a little in a medicinal Light, and that only as it is a Drinkable, becauſe ſhould I conſider the ſundry Preparations afforded by the Elder-Tree, both for internal and external Intentions, I ſhould wander from my Purpoſe, and enter a large Field. This Juice abounding with fixed Salt is admirably fitted to cleanſe and paſs off by the renal Glands, which gives them a *Stimulus*, encreaſes the Motion of the Blood in them, and at the ſame Time accompanied with a ſoftening anodyne Oil, which lubricates the Veſſels, prevents any ſenſible Irritation from the Salts, therefore will it be a notable Diuretick, provoke much Urine, and cleanſe the Ureters, Kidneys, and Bladder from ſabulous Matter, ſmall Stones, Sand and Gravel: Becauſe whatſoever irritates the urinary Paſſages, calls a greater Afflux of Blood to them and the circumjacent Parts, not only this, but the *Momentum* which the fixed Salts add to the Blood, and the Rarefaction thereof by the volatile Salts; therefore does this Wine provoke the *Menſes*, when obſtructed either by a Toughneſs of the Juices, or great Scarcity in the uterine Veſſels, or the Reſiſtibility, Contractedneſs, or Flaccidity of the Tubes themſelves. As it encreaſes the Afflux of Blood thither, and fills the Veſſels, therefore is it a fit Draught where the *Lochia* are ſuppreſſed, or the Secundine retain'd, as alſo in weak or ſlow Labour. As it irritates the Kidneys and urinary Channels, it is good in any partial or total Obſtruction of Urine. Its powerful Operation upon the urinary Paſſages was carefully obſerved and admired long ſince by *Foreſtus*, *Petræus Noſolog. Mathiolus*, *Mullerus*, &c. Its Emmenagogic Virtue is proved and applauded by *Quercetan*, *Gabel Shover*, *Dioſcorides*, *&c.* who alſo found the Succeſs of ſundry Preparations of the ſame Shrub in curing the *Menſes nimios*. This Juice having plenty of Salts and Oil, the firſt makes it a great Opener of Obſtructions in the Liver, Spleen, Meſentery, *Pancreas*, and other Parts, and ſo a great Cure of the Jaundice, Dropſies of all Sorts, Cachexies, Leucophlegmatia's, and Scurvy, for which Intentions it comes to us recommended by *Mindererus*, *Quercetan*, *Dioſcorides*, *Foreſtus*, *Crollius*, *Blochwich*, *Nicholas*, *Mullerus*, *Benedict*, *Veronenſis*, &c. as it cuts and thins groſs, thick, earthy Humours, ſtimulates their Veſſels, and gently eliminates the atrabiliary Matter by Stool, and at the ſame Time refreſhes the Perſon, elevates his Spirits, and invigorates him, it muſt be highly ſerviceable to melancholy Tempers. Not only is this Juice an Alterative, but a gentle Purgative, and Provoker of Sweat; by the firſt it carries off the *Colluvies* of Water from the Belly, purges Phlegm, Choler, and Serum, eaſes the burden'd Lymphaticks of their Load, by its firſt attenuating the ſizy Serum and then purging it off. As it is a Sudorific (which is owing to its volatile Salts) it is good in obſtructed Perſpirations, or in Colds therefrom, or in intermitting Fevers after a Vomit, becauſe it encourages Sweating, attenuates and breaks the groſs Humours, diſpoſes the Urine to depoſite its Sediment, prepares the Body ſooner and with greater Safety for the Bark. In time of the Plague or other epidemic Diſeaſes, a Glaſs of this Wine is good before Dinner or Supper; *Alſunus* ſays the *Ægyptians* uſe the Oil of Elder thus, they dip a Sheet in it, then ſqueeze it out and wrap up the infected Perſon in it, and ſo lay him in bed to ſweat, whereby they cure Multitudes; they promote and ripen the Buboes with a Cataphlaſm of Elder Flowers and Honey, or a Liniment of their Oil, Honey, and *Sal Armoniac*. With Powder of Elder Flowers and Leaves, or with roaſted Onions and Rob of Elder; or of Elder and Borrage Leaves, Muſtard-Seed, and rancid Nut-Kernels; when the Ulcers are broke, they dreſs the Ulcer with Juice of Elder Leaves and Honey, or Oil of Elder Kernels and Turpentine. In peſtilential Fevers the Juice is no leſs uſeful as it promotes a *Diaphoreſis*, fortifies Nature, refreſhes the Spirits, and is an Antidote againſt Infection; for its Vinegar is a Preſervative in Health, and deſtroys the Exhalations of Diſeaſed Bodies. In burning Fevers this Vinegar, with a little Sugar, and mixed with Water, cools much, cuts the groſs and tough Humours, opens Obſtructions, quenches Thirſt, refreſhes, and cleanſes off much Humours. *Alſunus* ſays that Elder-flower Water or Wine is the moſt excellent and familiar Medicine uſed by the *Ægyptians* in the Small-Pox. The Oil of the Berries is exceeding ſoftening and anodyne, therefore is a Fomentation of its Flowers admirable in pain'd, ſwell'd, or inflamed *Hæmorrhoids*. This Wine cures Fits in Children, by evacuating that black, yellow, putrid, or acid Matter which laid in the Belly, pricked and pained the Bowels. It is alſo proper Drink for the Nurſe in this Caſe to take off the Sharpneſs, Saltneſs, or

Seroſity of her Milk. Theſe come to Age will find their Advantage in uſing it, to ſweeten the Blood, provoke Sweat, open the Belly, afford nervous Juices, and check the irregular Incurſions of the Spirits into ſome Nerves and Muſcles. Its volatile Salt and Spirit, and ſudorific Property make it ſerviceable in Apoplexies and Palſies. As it provokes Sweat, actuates the Blood, cleanſes the Glands, and affords nervous Juice, it is good in Dullneſs of Hearing or Deafneſs from groſs Humours, relaxing the Drum of the Ear, or loading the auditory Nerves with groſs ſizy Juice, as it thins the Blood, ſcours the Glands and purges off ſerous Humours; for the ſame Reaſon it is proper for Rheums on the Eyes. It cleanſes, dries, and heals Inflammations, Tumours, or Ulcers of Noſe, Mouth, or Throat, becauſe it ſheaths the Salts, deterges the Veſſels, ſweetens the Blood, and cauſes a *Diaphoreſis*, therefore it is good in Scurvy, Leproſy, Scales, or Dandriff. In Blood Spitting it thickens the thin Blood, ſweetens the Salts, and affords Balſam to the Veſſels. In an Aſthma or Difficulty of Breathing from a Stuffing of the Lungs with viſcid Phlegm, or from the Sharpneſs of the Blood contracting, ſtimulating, and convulſing the Veſſels, it cuts, attenuates and thins in the firſt Caſe; and blunts, ſheaths, relaxes, and pacifies in the laſt: For the ſame Reaſon it is good in a Cough, cauſed either from the Groſſneſs of the Humours, Sharpneſs of the Salts, or Thinneſs of the Blood, or in a Hoarſeneſs from the Stuffing of the tracheal Veſſels with a ſizy Slime, or from a Dryneſs of the Parts; eſpecially in that Hoarſeneſs which attends ardent Fevers, it is good, if mixed with Syrup of Violets and Water. In a baſtard Pleuriſy or Conſumption it is very beneficial; for in the firſt it attenuates, and waſtes the groſs and flatulent Humours by Sweat; in the laſt it cleanſes the Ulcers, ſweetens the Blood, blunts its Salts, lines the Veſſels with a balſamic *Litus*, and helps to heal them. In Syncopes and Fainting it revives the Spirits, takes off Swooning and low Spiritedneſs. The Spirit of Elder Berries (like Brandy) or Wine made of the dried Berries, ſtrengthens a weak, and cures a flatulent Stomach, carries off the Phlegm and helps Digeſtion, ſtops the Belchings and Vomitings of a lax and cold Stomach. This Wine cures and prevents flatulent Cholicks, by helping downward pituitous, vitrious, and flatulent Humours; therefore it is alſo good in Worms, eſpecially if Bitters be infuſed in it. In all Fluxes of the Belly, *Crollius*, *Quercetan*, and *Wolfius* pretend a great Secret of the Juice of the Berries. *e. g.* Flower made into a Paſte and baked, then pounded and baked again, with freſh Juice, and ſo a third Time, one Dram of this with a little Nutmeg in a ſoft roaſted Egg, they ſay, cures the moſt obſtinate Looſeneſs, but it is ſo aſtringent that they gave two or three Purges of the Syrup of Elder Flower made with Elder Flower Water. In a great Conſtipation, *Hippocrates* and *Ægineta* recommend Juice of Elder Leaves, or their Water with the Syrup of the Flowers. There is alſo an hyſterick Spirit made of Elder which cures Vapours, brings down the *Menſes*, expells Birth and After-birth. *Hippocrates* cured moſt uterine Diſorders by Things prepared out of this Shrub, as *Hydrops Uterinus*, ſuppreſſed *Lochia*, Inflammations or Ulcers of the *Uterus*, *&c.* Arthritick and Rheumatick Pains receive great Relief by attenuating and ſweetning the Blood by gentle Purgation and Sweating; theſe the Elder afford. Thus I have given a ſhort Detail of the Benefits the Elder Tree affords us, by a Wine either of the Flowers (which tho' fetid, yet its Uſefullneſs fully compenſates its diſagreeable Taſte) or Juice of the Berries, or of the dried Berries, or Juice or Syrup of Leaves or Flowers; I might have enumerated ſeveral others warranted and recommended by inconteſtable Authority ſhould I not be too tedious; I have omitted its External Uſes, which are as numerous as its Internal. The bad Effects of this Wine may be gathered from what is ſaid in the firſt Paragraph.

Of RASBERRY-WINE.

OF all our made Wines thoſe of Strawberries and Raſberries are moſt delicious to the Taſte; they lightly and pleaſantly ſtimulate the Nerves of the Mouth and Noſe with a moſt agreeable Smell and Taſte, which proceeds from a Mixture of their eſſential Salt and fine Oil, for the Principles of both thoſe Berries are very near the ſame, only Raſberries contain more fine Oil, and the other more Phlegm; therefore I ſhall briefly conſider them promiſcuouſly.

Theſe Wines are very proper and reviving in Syncopes, Faintings, or Swoonings, becauſe they gently and pleaſantly tickle the Nerves, their mature, and attenuated Oil and eſſential Salt, being by Fermentation reduced to a ſubtile Spirit, pierce the Interſtices of the Veſſels, raiſe the Spirits, afford ſpeedy Supply of ſome nervous Juice which invigorates their Springs. In ſcorbutic Diſorders, the Uſe of thoſe purify and ſweeten the Blood, dilute or obtund its Salts, give the Fibres a better Tenſion to promote a due Mixture of the Juices. In nephritick

Pains, they ſweetly ſtimulate the ſecretory Ducts of the renal Glands, lightly prick the Membranes of the ſmall renal Baſons, whereby they being excited and invigorated ſhake off their ſtagnating, attracting, and cohering Load, and free the Parts from Pain; the Phlegm of the Wine at the ſame Time has no ſmall Share in diluting and attenuating the Slime or Sand in the Kidneys. In Rawneſs, Weakneſs, and Indigeſtion of the Stomach, the agreeable Titillation of theſe Wines gives its Coats a better Tenſion, elevates their Spring, and fortifies it. Their ſlight Aſtringency, together with their ſweetly warming Spirit, make them proper in Looſeneſſes, and too great Diſcharge of the *Menſes*; their Plenty of make them more cooling and moiſtening, than other Wines, therefore are they preferable in Thirſt. As they are cordial and cooling, they and Water mixed make a good reviving Draught in ardent Fevers; as they cool and moiſten, they are very proper for warm Weather, young People, bilious Conſtitutions, in too Sharp or Fluid a State of the Blood, or where the Animal Juices are too much agitated (I know of no bad Effects they have, except they be drank to Exceſs; which is rarely the Caſe in drinking of made Wines) but here we would be underſtood as ſpeaking only of ſmall Wines of this Sort.

N. B. To prevent Miſtakes in the Prejudiced or Unwary, from what I have ſaid on Spirits; I muſt add, there is a great Odds between their real and apparent Effects; for by the firſt they give a ſudden Contraction to the Fibres and Veſſels, and coagulate the Blood and their Animal Juices, in Proportion to the Quantity drunk, as I have proved from ſeveral Experiments mentioned in another Diſcourſe, and oftner than once hinted in this *Appendix*. But from their apparent Effects, they ſeem (tho' falſly) to rarefy the Fluids and relax the Solids, like Opiates by their cauſing a ſtammering Speech or Dumbneſs, Inability to uſe Feet or Hands to good Purpoſe, Doſing, Sleepineſs and Drunkneſs, *&c.* from their producing a Diſtenſion and Dilatation of the Veſſels of the Brain. Hence, 1. The conſtituting Membranes of thoſe Veſſels become thinner, and occaſion a too large Secretion there. 2. Very probably this Diſtenſion compreſſes the Origins of the Nerves: Hence a regular Influx of the nervous Juices is leſſened or prevented. Spirits alſo cauſe a depauperated State of the Fluids, by ſuddenly contracting and relaxing the Veſſels till their Tones is deſtroyed, whereby the Ballance of Nature between Solids and Fluids is loſt, and with it the due and neceſſary Mixture of the Blood.

A CATALOGUE of the Authors and Papers abridged in this Work.

Doctors.

John Jones on *Buxton*, Page 37.
Martin Lyſter on *Buxton*, 47.
Leigh on *Buxton*, 48.
Allen on *Buxton*, 59.
Martin on *Buxton*, 59.
Witty on *Scarburgh*, 114.
Simpſon's *Hydrologia Chymica*, 121.
Wittie's *Pyrologia Mimica*, 127.
Simpſon's Hydrological Eſſays, 132.
Tonſtal's *Scarburgh* Spaw ſpagirically anatomized, 139.
Wittie's *Scarburgh* Spaw Anatomiſer diſſected, 143.
Tonſtal's New Years Gift for Dr. *Witty*, 148.
Liſter on *Scarburgh*, 152.
Foot's Letter to Dr. *Wittie*, 152.
Highmore's Letter to Dr. *Wittie*, *ibid.*
Wittie's Anſwer to both, 155.
Simpſon's Anſwer to Dr. *Foot*, 158.
Simpſon's Anſwer to *Tonſtal*, 159.
Allen on *Scarburgh*, *ibid.*
Simpſon on *Malton*, 197.
Dean's *Spadacrene Anglica*, 236.
Stanhope's Summons to the Northern Spaw, 242.
Frenche's *Yorkſhire* Spaw, 246.
Simpſon's *Knareſburgh* Spaw, 259.
Neal on *Harrigate* Spaws, 286.

A TABLE of the Waters examined.

Note, *y.* ſtands for *Yorkſhire*, *d.* for *Derbyſhire*, *l.* for *Lincolnſhire*, *n.* for *Notinghamſhire.*

Albledee Spaw, *y.* 280.
Acworth Spaw, *y. ibid.*
Aſwarby Spaw, *l.* 215.
Aſkeron Spaw, *y.* 303.
Anſby, *l.* 223.
Aſhover, *d.* 275.
Beverley, *y.* 280.
Beighton, *d.* 275.
Beauchief, *d.* 277.
Bilton, *y.* 296.
Buxton, *d.* 23.
Blackpark, *y.* 280.
Buxton-Chalybeate, *d.* 229.
Burlington, *y.* 230.
Broomleſs-Moor, *y.* 272.
Burleigh-Moor, *y.* 275.
Bandwell, *l.* 107.
Bullhouſe, *y.* 281.
Bithams, *y.* 276.
Burgh, *d.* 277.
Burleigh, *Exeter*, 277.
Braughton, *y.* 300.
Catcliff, *y.* 304.
Cawley, *d.* 305.
Cawthorp, *l.* 224.
Crawſhaw Spaw, *y.* 275.
Caſtleton, *d.* 277.
Cheſterfield, *d. ibid.*
Cricklee, *y.* 300.
Croft Spaw, *y.* 299.
Cropton (*high*,) *y.* 280.
Darnal, *y.* 275.
Darfield, *y.* 276.
Dofield, 4 Spaws, *d.* 276.

A TABLE of the Waters examined.

Didderſley Grange, *y.* 279.
Dodworth, *y.* 281.
Eagles-Ster, *d.* 277.
Fullwood, *y.* 271.
Filah, *y.* 298.
Grana-Side, *y.* 276.
Grantham, *l.* 278.
Guilethwait, *y.* 269.
Harrigate, 5 Sulph. Wells, *y.* 285.
Hinſworth, *y.* 281.
Highhouſe, *y.* 276.
Hope Spaw, *d.* 277.
Ichley Spaw, *y.* 307.
Kinalton, *n.* 367.
Keddleſton, *d.* 305.
Knareſburgh, *y.* 296.
Knareſburgh Chalyb, 136.
Knareſburgh Dropping well, 105.
Leeds, *y.* 303.
Long-Addingham, *y.* 281.
Loſkholm, *y.* 280.
Matlock warm Water, *d.* 71
Matlock-Bridge, *d.* 276.
Middleton Bath, *d.* 92.
Middleton (Stoney) d. 94.
Middleton (Stoney) Chal. *d.* 280.
Middleton, *y.* 280.
Malton, *y.* 196.
Newhall, *y.* 280.
Normanby (Upper) y. 299.
Normanby (Nether) y. ibid.
Newtondale, *y.* 297.
Oldfield Spaw, *y.* 297.
Orſton, *n.* 220.
Parkhall Spaw, *y.* 280.
Quarndun, *d.* 268.
Rawmarſh, *y.* 276.
Ranfield, *y.* 276.
Retford (Eaſt) n. 228.
Ridmer, *y.* 303.
Rouſeley-Bridge, *d.* 277.
Rumley, *d.* 280.
Rodhilt, *y.* 230.
Scarburgh, *y.* 112.
Stenfield, *l.* 211.
Semperingham, *l.* 222.
Sheffield, *y.* 275.
Shaw Spaw, *y.* 280.
Skipton, *y.* 281.
Skipton, *y.* 301.
Shuttlewood, *d.* 304.
Tadcaſter, *y.* 280.
Tankerſley, *y.* 283.
Tibſheb, *d.* 222.
Thurſk, *y.* 225.
Tolthorp, *l.* 278.
Thorntonruſt, *y.* 280.
Walcote, *l.* 223.
Wirkſworth, *d.* 93.
Wirkſworth, 306.
Wirkſworth, 276.
Whiſton, *y.* 276.
Ulley, *y.* 276.
Wiſper, *y.* 276.
Wiggſleſworth, *y.* 302.
Wittering, 278.
Woodſeats, 277.
Whitby, *y.* 279.
Wortley, 281.
Whittingon, *d.* 277.

Number of Spaws examined in this Work one hundred and thirty one.

ERRATA.

ERRATA.

N. B. p. ſtands for Page, *l.* for Lina, *n.* for Notes, *c.* 1 or 2 for Column firſt or ſecond.

PReface Page v. Line 27. for *Stones* read *Pores.* p. vi. l. 9. for *wanted* r. *reckon'd.* p. xi. l. 34. for *or Copper* r. *of Copper.* p. xii. l. 3. for *owning* r. *allowing.* p. xvi. l. 24. r. *was any Stone which.* p. xix. l. 12. for *croſt* r. *Croft.* p. xx. l. 11. for *had before given* r. *did afterwards find it neceſſary to give.*

Introduction p. i. l. 8. for *and Vitriol* r. *or Vitriol.* p. i. l. 29. r. *on a Courſe of.* p. iii. l. 5. after *laxative* a Comma. p. v. l. 38. for *leſs* r. *Loſs.* p. xviii. l. 23. Notes, for *amberſet* r. *Amber jet.*

Book, p. 23. l. 25. for *Mamton* r. *Mamtorr.* p. 28. l. 5 for *preternatural* r. *natural.* l. 11, 12. for *peclinites* r. *pectenites.* p. 37. Note, col. 1. l. for 158. r. 58. l. 26. for *letteth* r. *ſetteth.* p. 48. n. c. 1. l. 21. after *which,* r. *is.* p. 55. l. *penult,* for *not* r. *note.* p. 58. l. 39. for *Smelners* r. *Smelters.* p. 77. l. 1. for *exceed* r. *exude.* p. 78, 79. for *Cherſtone* r. *Chertſtone.* p. 80. l. 29. r. *of ſparr.* p. 83. l. 19. for *ſeven eighths* r. *an Inch and a half.* p. 88. l. 13. for *ſimple* r. *Purple.* p. 95. n. c. 1. l. 14. for *cynedale* r. *eyamdale.* p. 96. l. 27. for *peclinites* r. *pectinites.* p. 100. l. 11. for *great* r. *Gout.* p. 101. l. 2 for *the River* r. *Buxton River.* p. 103. l. 4. for *Drams* r. *Drinks.* p. 104. l. 2. for *flares* r. *Flames.* p. 113. l. 5. for *Albemane* r. *Albemarle.* p. 114. n. c. 1. l. 25. for *to Hull* r. *to Scarburgh.* p. 117. n. c. 1. l. 4. for *enlarge* r. *afford.* p. 119. n. c. 1. l. 43. for *ſchirr* r. *ſchirrus.* p. 125. n. c. 1. l. 38, 39. for *almoſt* r. *all moiſt.* p. 126. n. c. 1. l. 4. after *inſipid* add *Earth.* p. 130 n. c. 2. l. 23. r. *and of Whitby Alum-Stone.* p. 137. n. c. 1. l. 1. for *Explication* r. *Exſiccation.* p. 145. c. 1. l. 11. for *lilmgs.* r. *filings.* p. 161. l. 31. for *Petrefaction* r. *Infection.* p. 177. l. 28. for *Petreſſation* r. *Putrifaction.* l. 33. for *fills* r. *Fits.* 198. l. 20. for *thirty* r. *ten.* 203. l. 31. after *Syrup of* add *Violets and.* 209 l. 33. for *higheſt* r. *lighteſt.* p. 211. l. 3. for *Lancaſter* r. *Ancaſter.* p. 212. l. 14. for *where* r. *were.* p. 216. l. *ult* for *Setpeningham* r. *Semperingham.* p. 218. l. 32. for *abode* r. *abrade.* 219. l. 23. for *ſtonous* r. *ſtoney.* p. 220. l 24. for *Hemoptre* r. *Hemoptoe.* p. 220. l. 37. add *coal.* 226. l. 32. for *Stenfield* r. *Cheſterfield.* 229. l. 20. for *Hull* r. *Hall.* p. 263. n c 1. l. 6. for *Hydropi al* r. *Hydrological.* p. 276. l. 3. for *Crane more* r. *Grane more.* l. 5. for *upper* r. *weſper.* p. 278. l. 31. for *mitre* r. *miln.* p. 280. l. 29 for *Atwith* r. *Acwith.* l. 31. for *Abledee near* r. *Abledunear.* l. 32. for *Wachdale* r. *Wenchdale.* l. 37. for *Newall* r. *Newhall.* p. 281. l. 1. for *worthy* r *Wortley.* l. 5. for *Henyworth* r. *Himſworth.* p. 282. l. 11. for *coacuent* r. *evacuant.* p. 283. l. 8. r. *Nermanby.* l. 14. for *deimed* r. *denied.* l. 28. for *Tanderſley* r. *Tankerſley.* p. 286. l. 9. r. *dried* for *divided.* l. 11. r. *lift or raiſe up.* p. 287. l. 2. for *ſubtimed* r. *ſublimed.* l. 8. for *Bitton* r. *Bilton.* p. 295. l. 20. r. 256. l. 24. r. 86. p. 256. l. 19. for *Pints* r. *Grains.* p. 298. l. 5. for *the* r. *tho.* l. *ult.* r. 64. p. 299. l. 30. r. *Darlington.* p. 310 l. 33. r. *ſublimed.* p. 314. l. 14. r. *Iſlands.*

Appendix, p. 317. l. 3. for *califed* r. *cutified.* p. 324. l. 14. for *Thirſt* r. *firſt.* p. 328. l. 24. for *Lemons* r. *Oranges.*

Lately publiſhed.

A DISSERTATION upon TEA, explaining its Nature and Properties by many new Experiments; and demonſtrating from philoſophical Principles, the various Effects it has on different Conſtitutions. To which is added the natural Hiſtory of Tea; and a Detection of the ſeveral Frauds uſed in preparing it. Alſo a Diſcourſe on the Virtues of Sage and Water, and an Enquiry into the Reaſons *Why the ſame Food is not equally agreeable to all Conſtitutions*; in a Letter to the Right Honourable MARY Lady MALTON. By THOMAS SHORT, M. D. Sold by *Fletcher Gyles* againſt *Gray's-Inn* in *Holborn.*

Fig. 9.
Crystals of ye Salt of Harrigate Knaresburgh, Kedleston, Oldfeild, Skipton, Bilton Park, Shuttle Wood, Crepton & Normanby Sulphur waters all Marine Salt

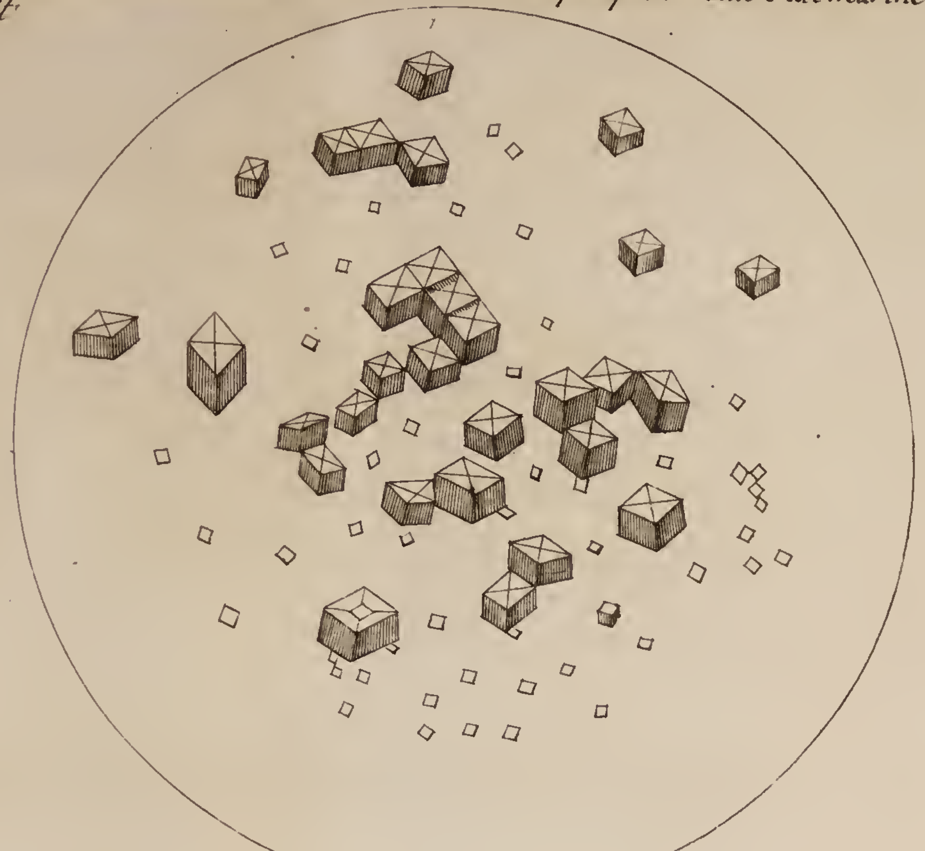


Fig. 10
Crystals of the Salt of Knaresburgh Dropping Well, only Nitre

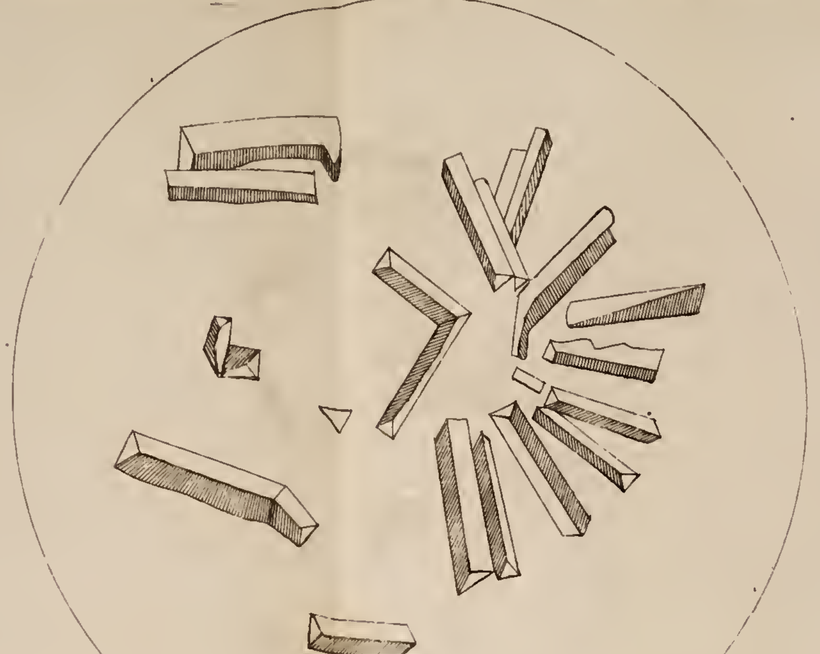


Fig. 11.
Crystals of the Salt of Stanfeild Band or Binding well Nitre a a a &c. Nitre Marine Salt b b b b.

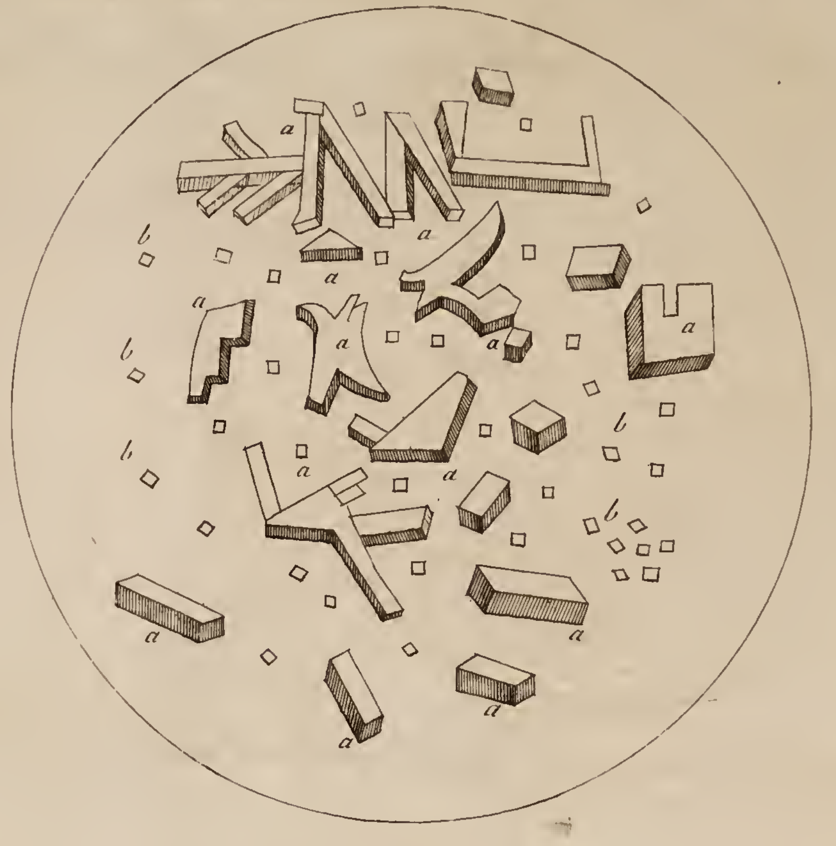


Fig. 12
Crystals of the Salt of Wigglesworth Spaw.

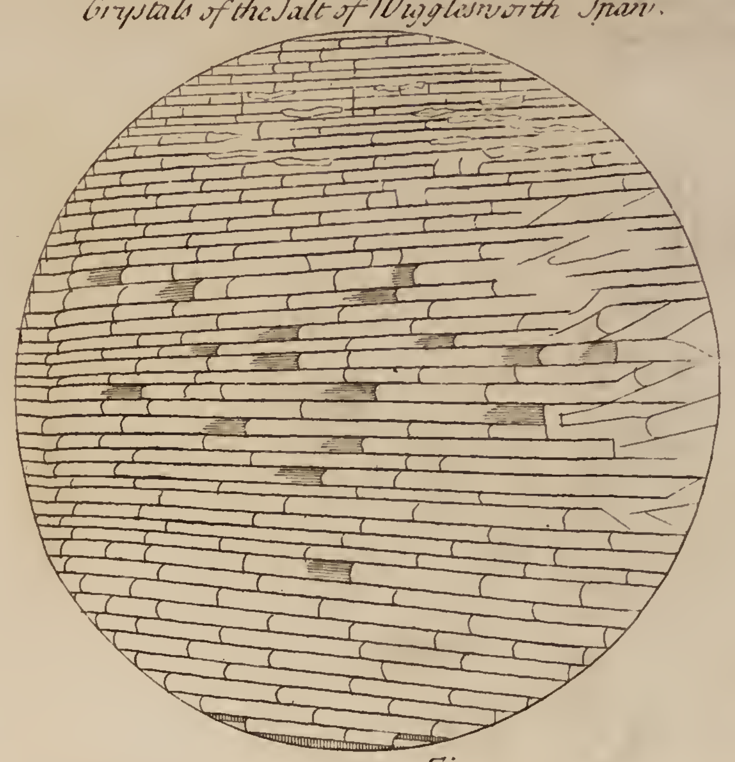


Fig. 13
Crystals of the Salt of Braughton Spaw a a a Nitre. the Smal black Spots are Marine Salt.

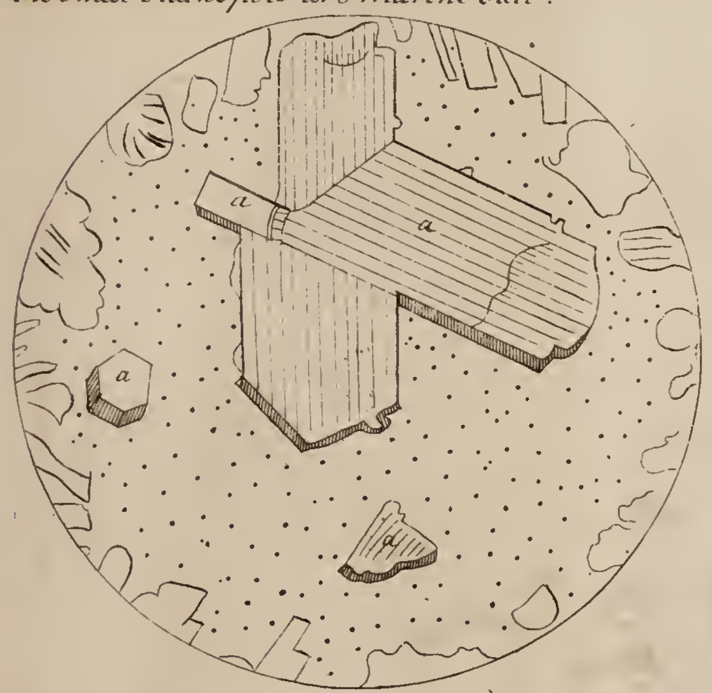


Fig. 14
Crystals of the Salts of Cricklegrounds Spaw a a a Nitre the rest are Marine Salt.

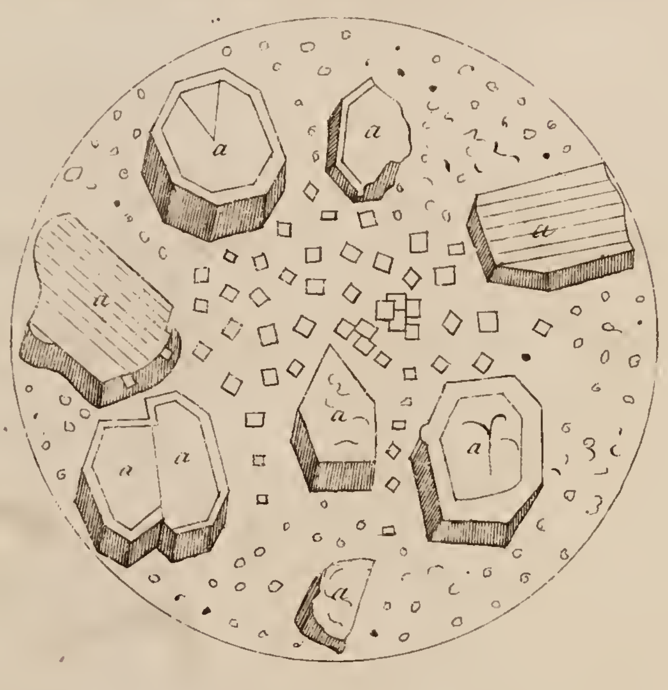


Fig. 15
Crystals of the Salt of Couley Spaw all Nitre

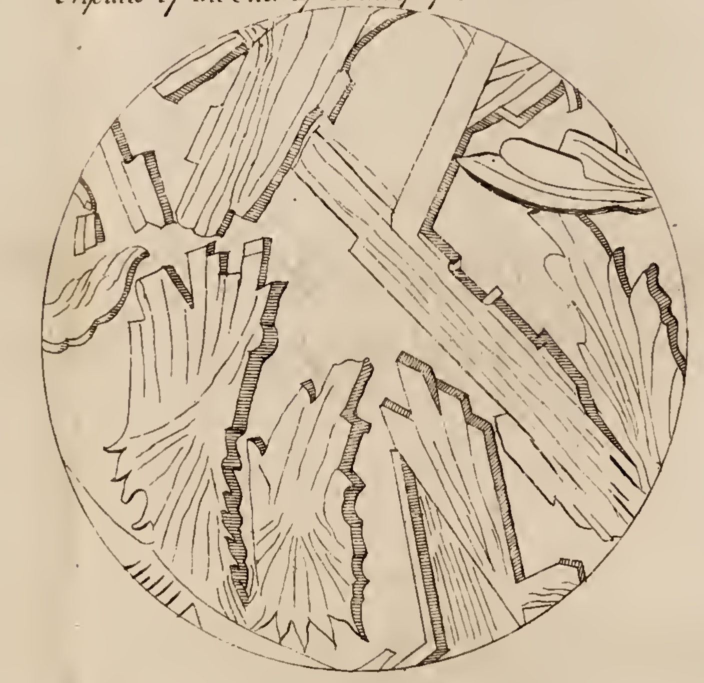


Fig. 16
Crystals of the Salt of Middleton Bath Warm Water. a a a Marine Salt b b b Nitre.

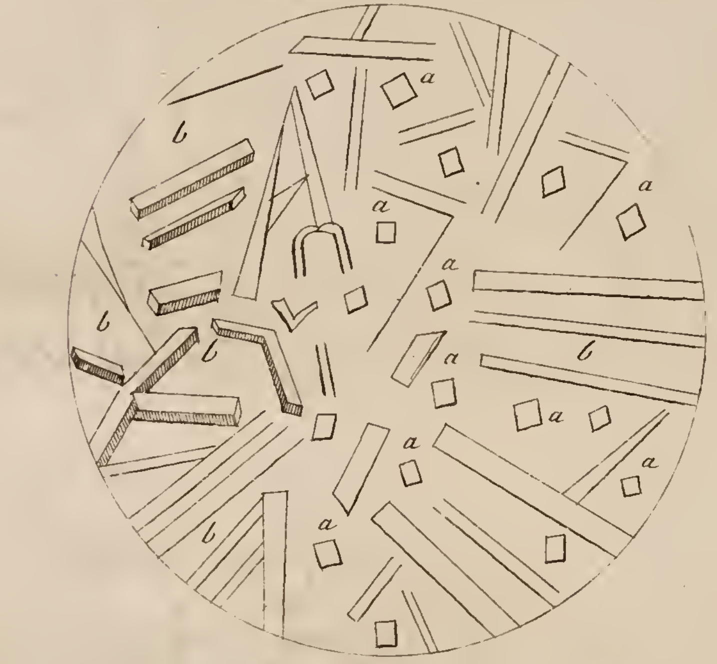


Fig. 17
Crystals of the Salt of Stoney Middleton Drinking Spaw a a a Marine Salt b b b Nitre

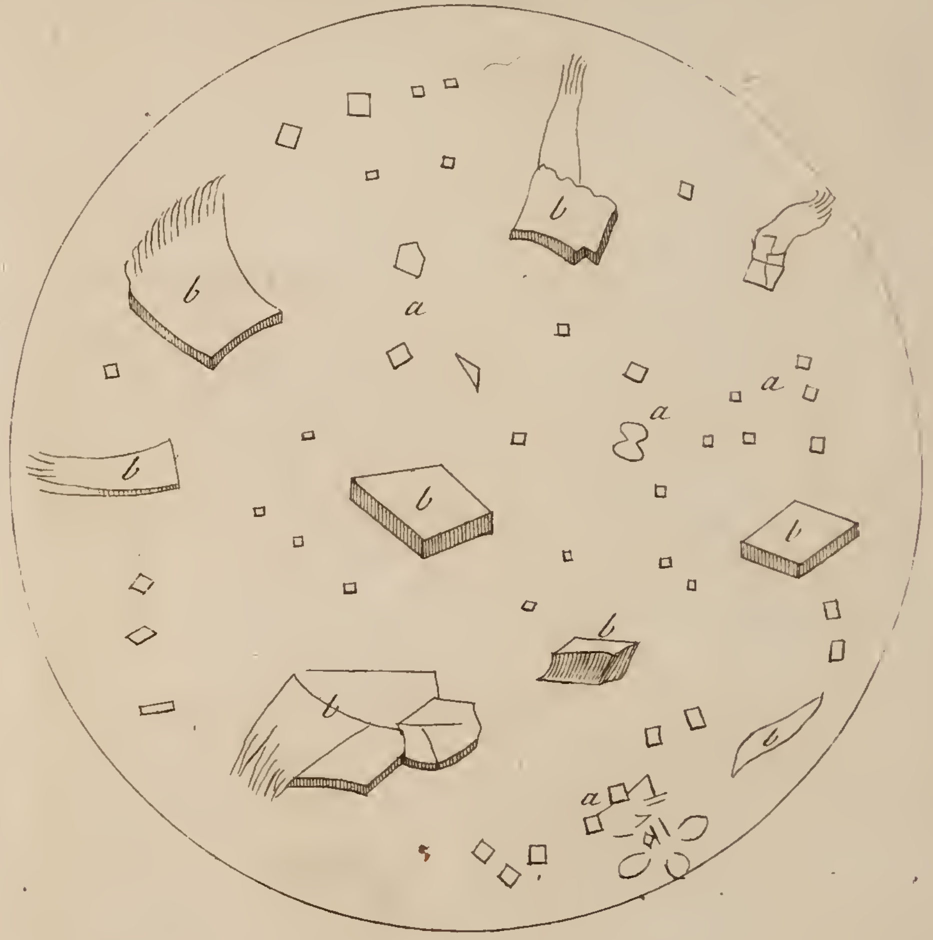


Fig. 18
Crystals of the Salt of Stoney Middleton warm Bath a a a Marine Salt b b b Nitre

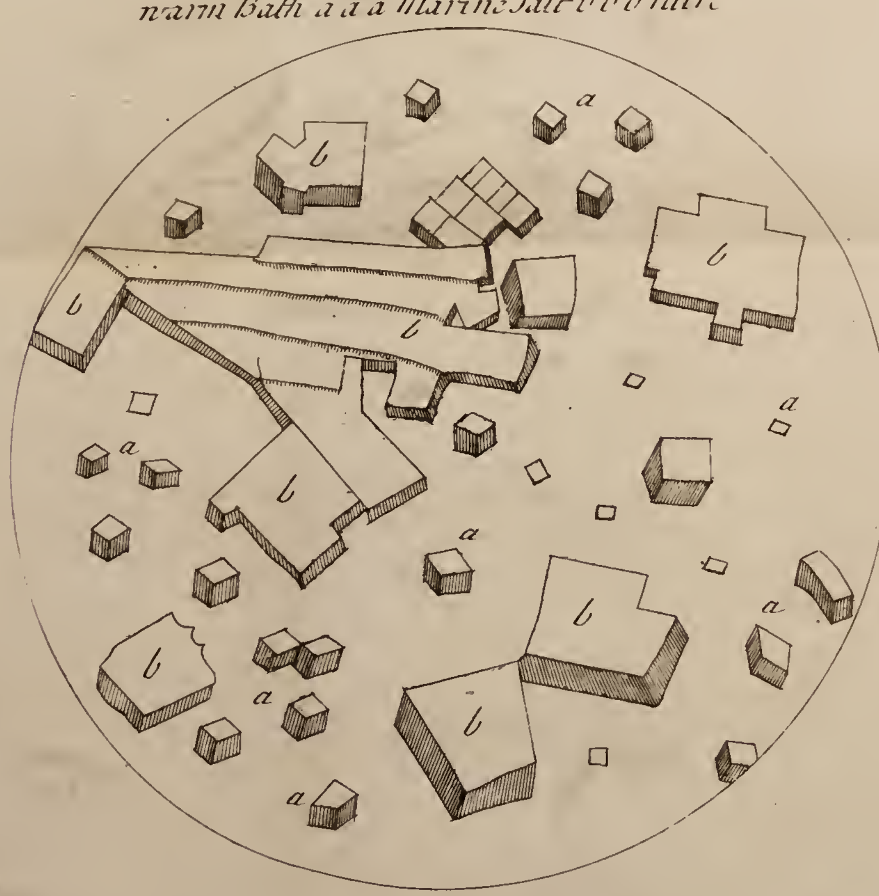


Fig. 19
Crystals of the Salt of Kidmer well? a a a Marine Salt b b b Nitre

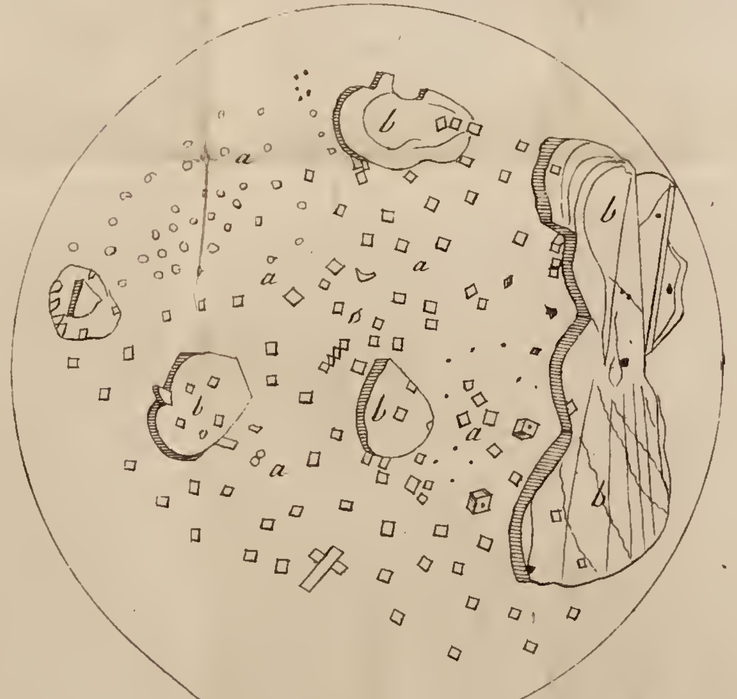


Fig. 20
Crystals of the Salt of Askeron Spaw a a a Marine Salt b b b Nitre

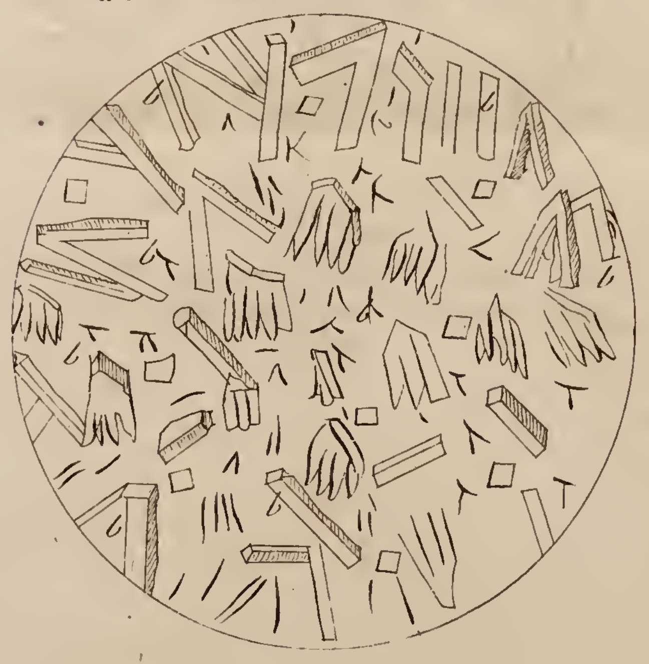
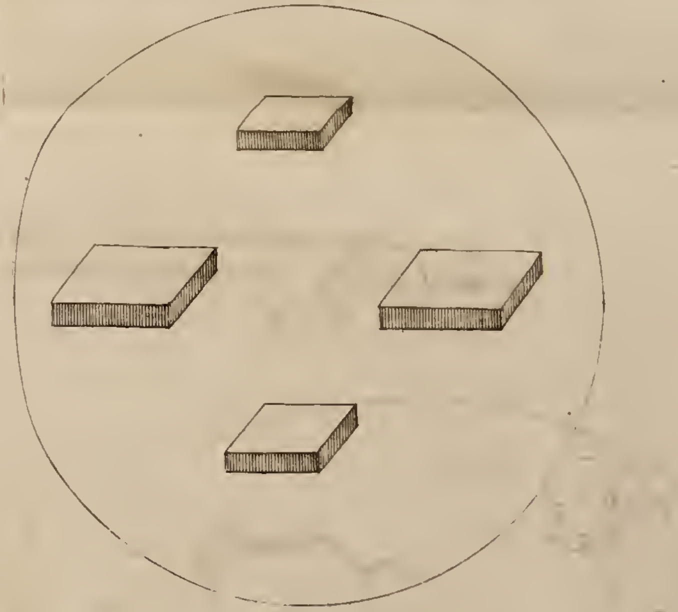


Fig. 21
Crystals of immature Vitriol from the pyrites under Harrigate Alum well.



To the Right Hon.ble The Earl of Burlington &c. this Plate with the Discourses on Knaresburgh, Harrigate, & Stoney Middleton is humbly Dedicated by his Lordships most humble Servant —
Tho: Short.

Fig. 29
Crystals of Scarborough Purging Water Salts
b b b Nitre a a a a Marine Salt

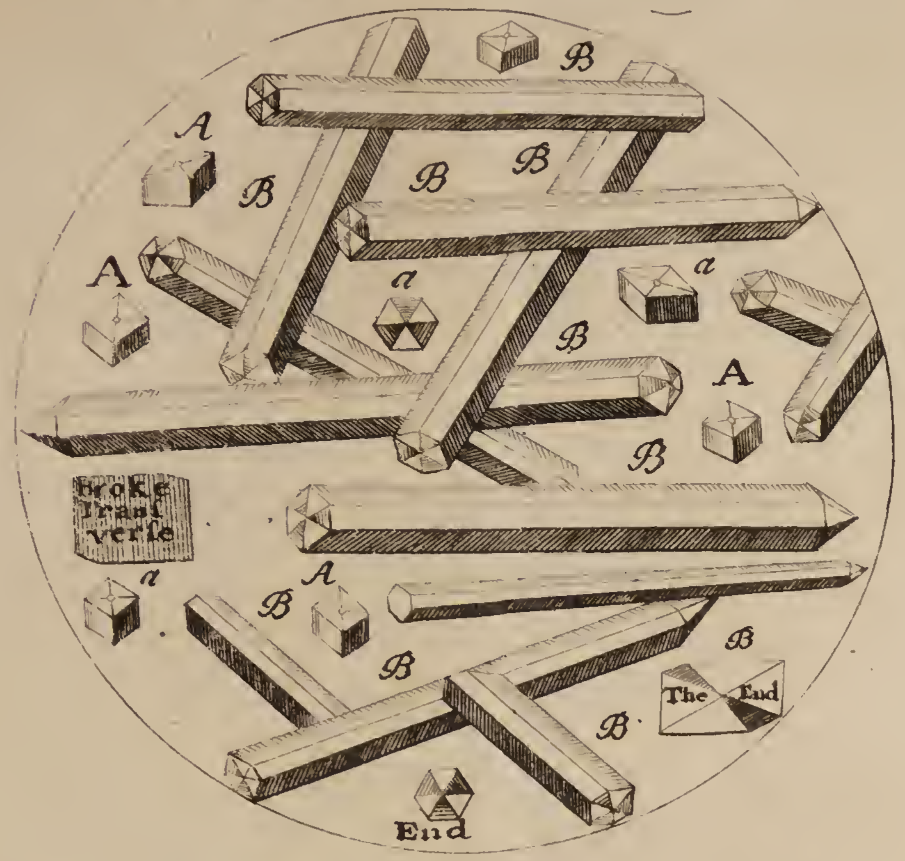


Fig. 30
Crystals of the Salt of Scarborough Chaly-beate
Water a a a Marine Salt. b b b Nitre.

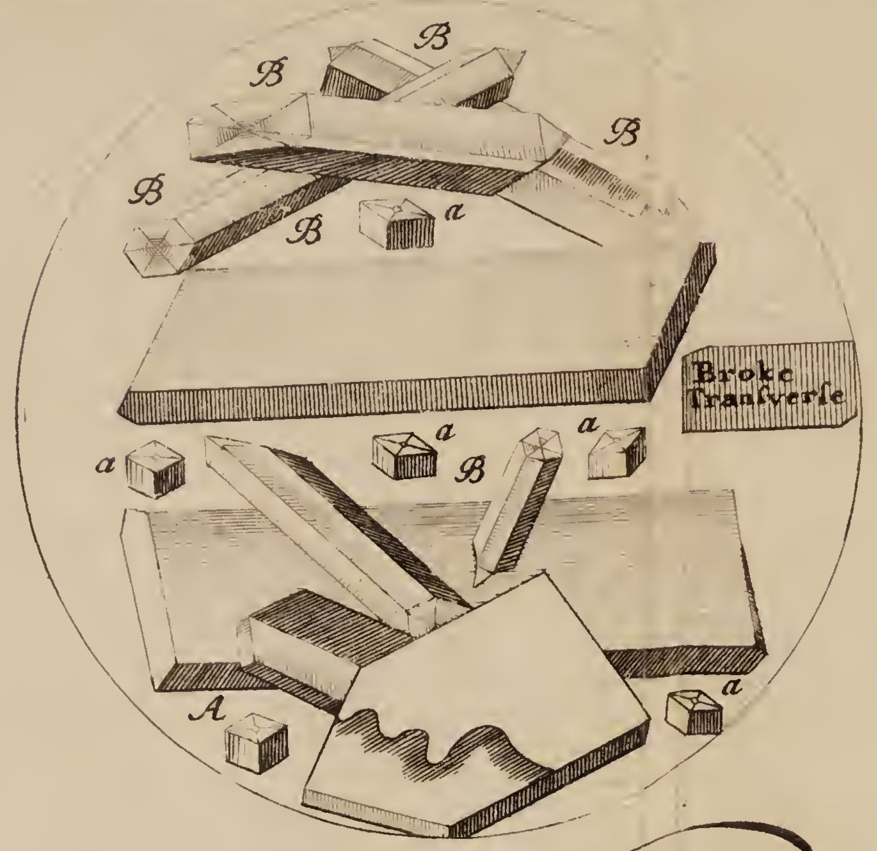
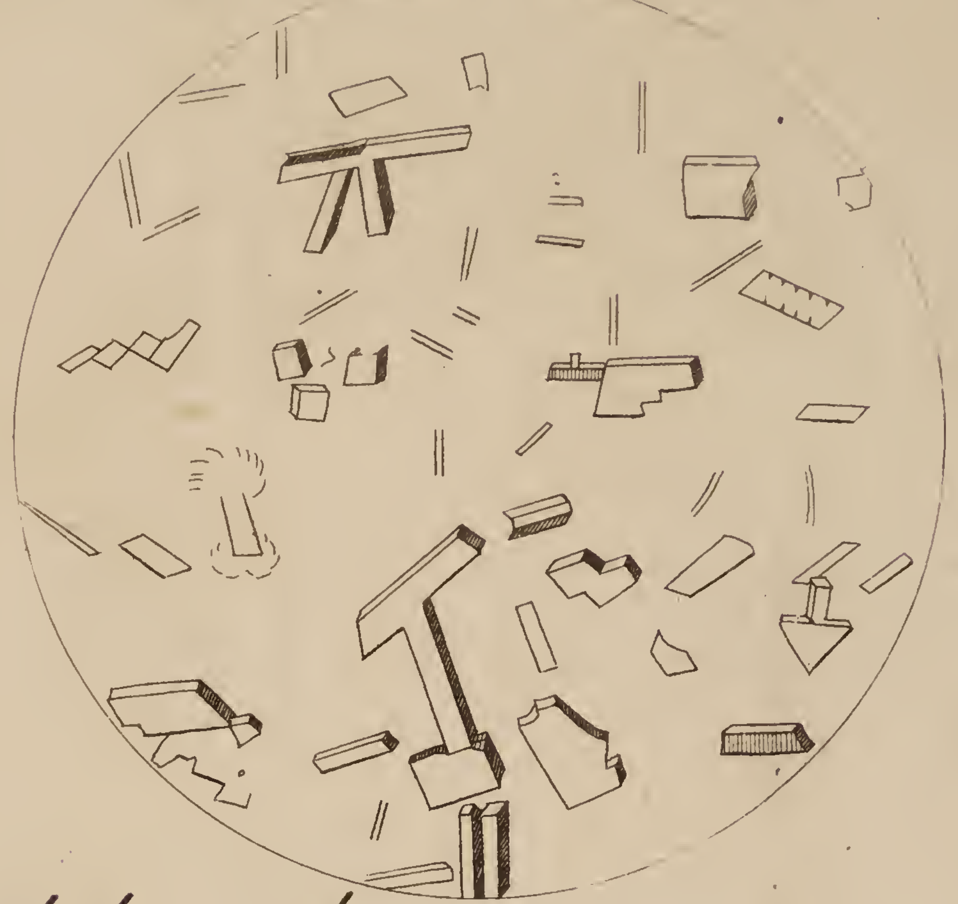


Fig. 31
Crystals of the Salt of Orston Spaw Water.



To the Right Honourable S^{r}: Will^{m}: Strickland. His MAJESTIES
Secretary at War This Plate wth: y^{e} Examination & Discourse on Scarborough Waters, is dedicated by his
very humble Serv^{t}: Tho. Short.

Fig. 32.
Crystals of the Salt of Aswarby Spaw.
which are only Nitre.

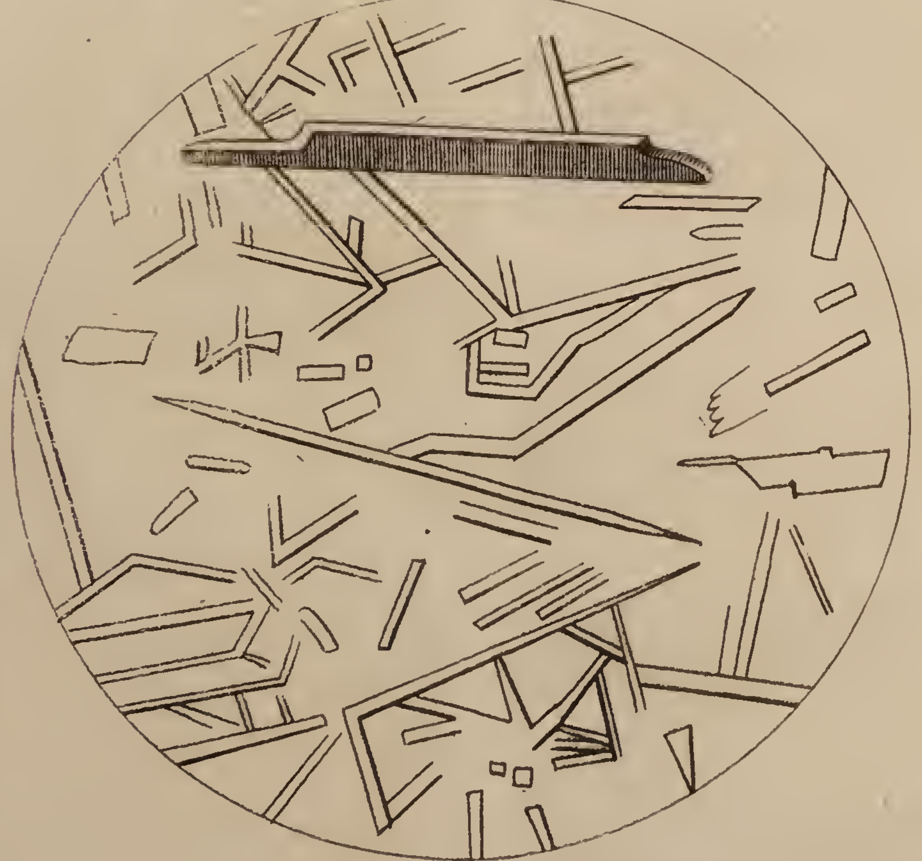


Fig. 33
Crystals of Aswarby Salt perfectly formed

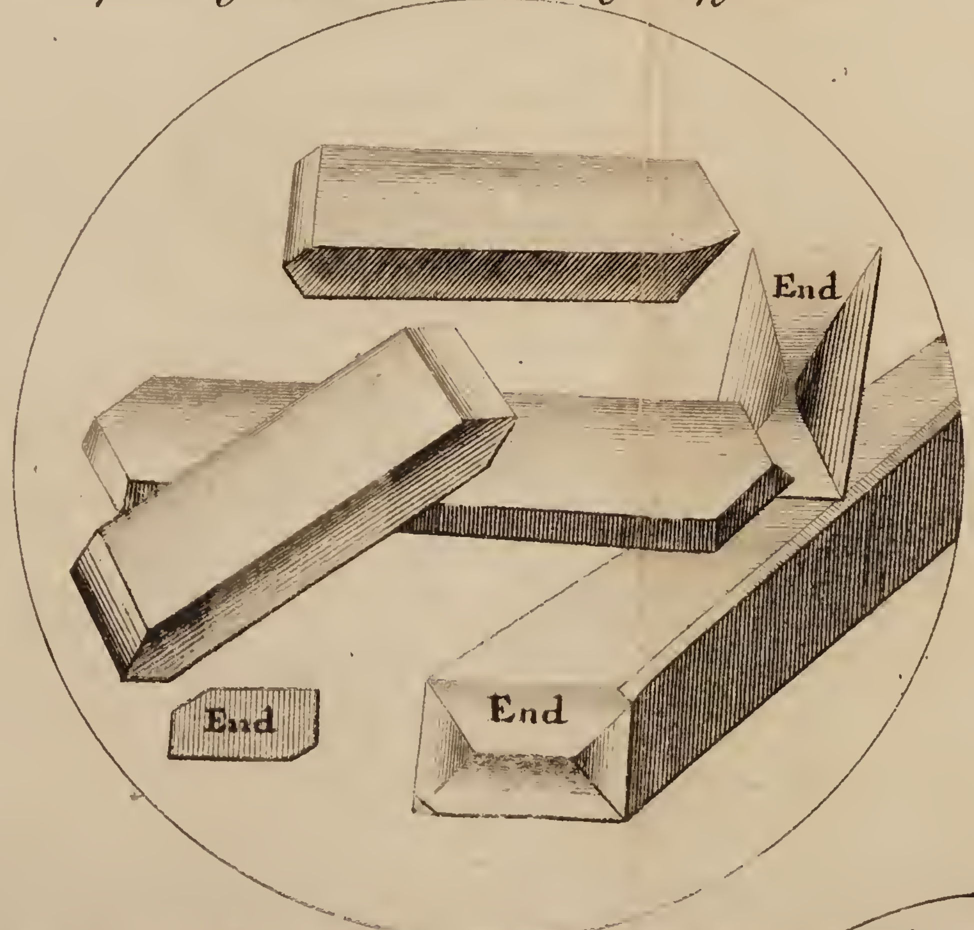
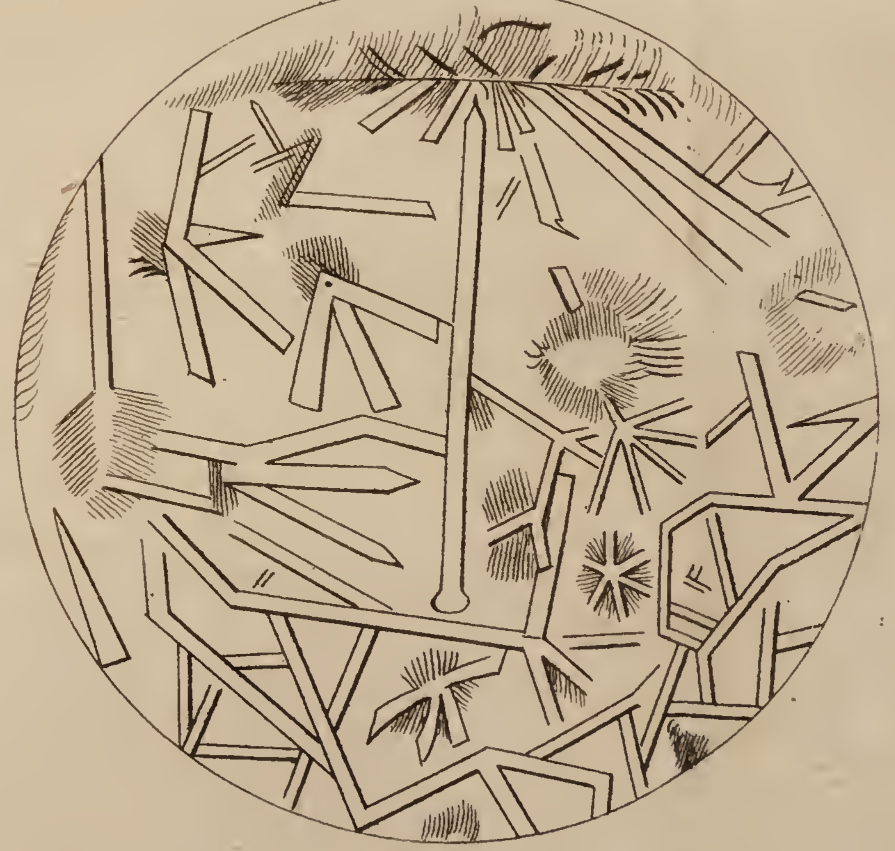


Fig. 34
Crystals of the Salt of Walcote Spaw.



To the Honourable S^{r}: Fran^{s}: Whichcote Bar^{t}: This Plate
with the Examination & Discourse on Aswarby Spaw is dedicated by his
very humble & oblig'd Serv^{t}: Tho: Short.

Fig. 22.
Crystals of the Salt of Malton Span b b b b &c
Nitre a a a a Fixt Vitriol.

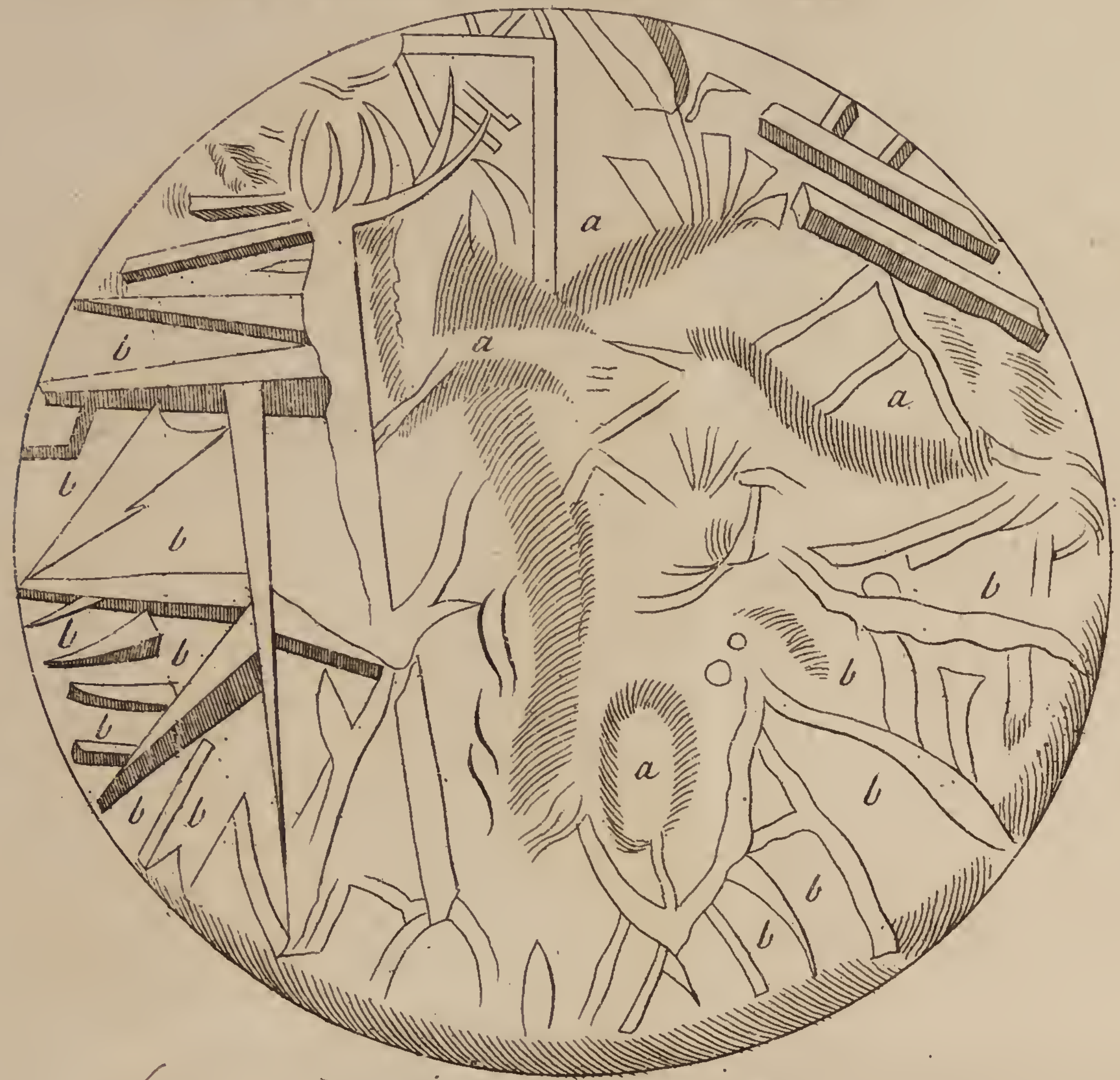


Fig. 23
Crystals of the Salt of Malton Span Diſsolved
and Filtered several times & are chiefly Nitre.

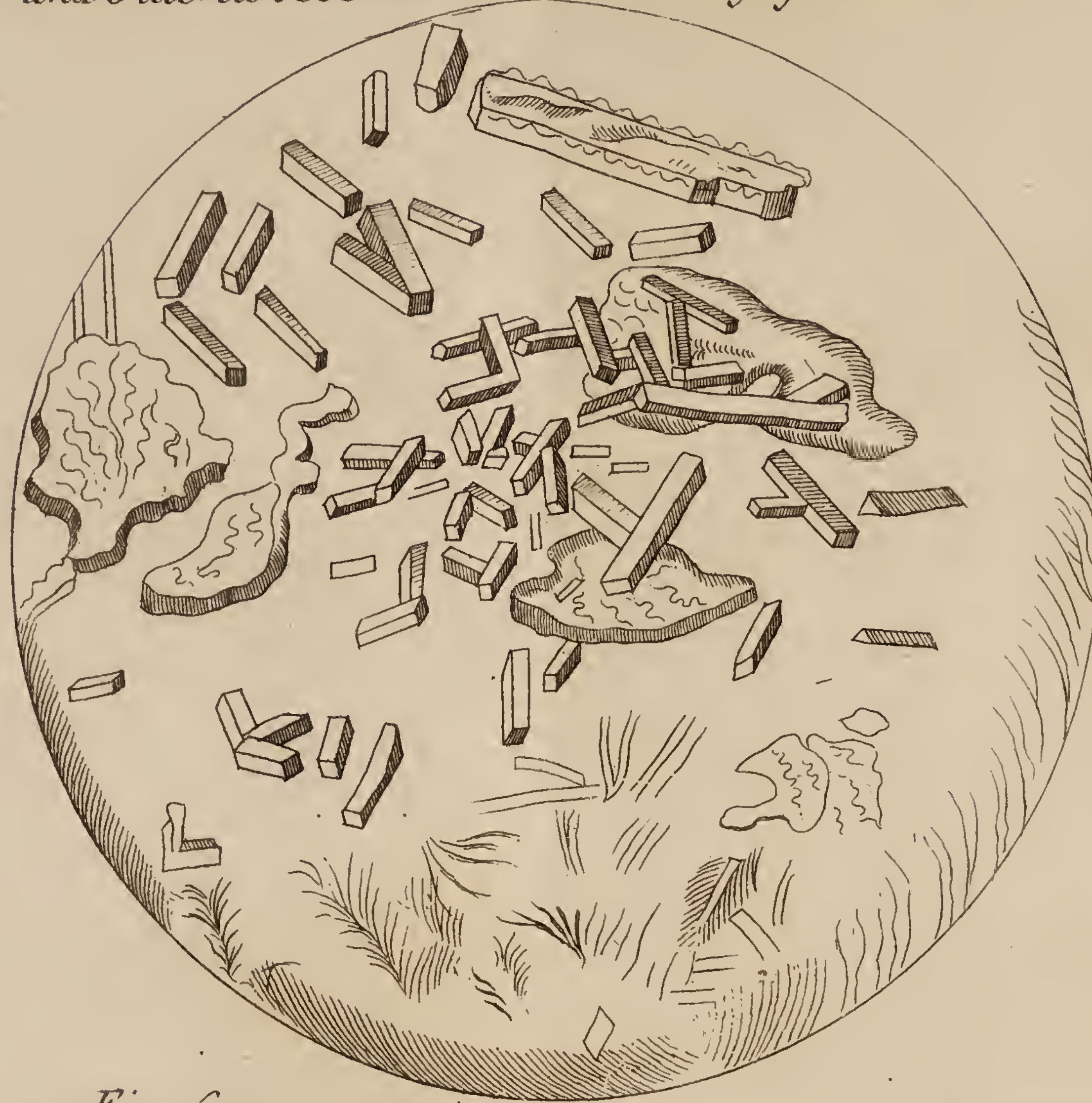


Fig. 24
Crystals of the Salt of Thursk Span b b b Nitre
a a a Marine Salt.

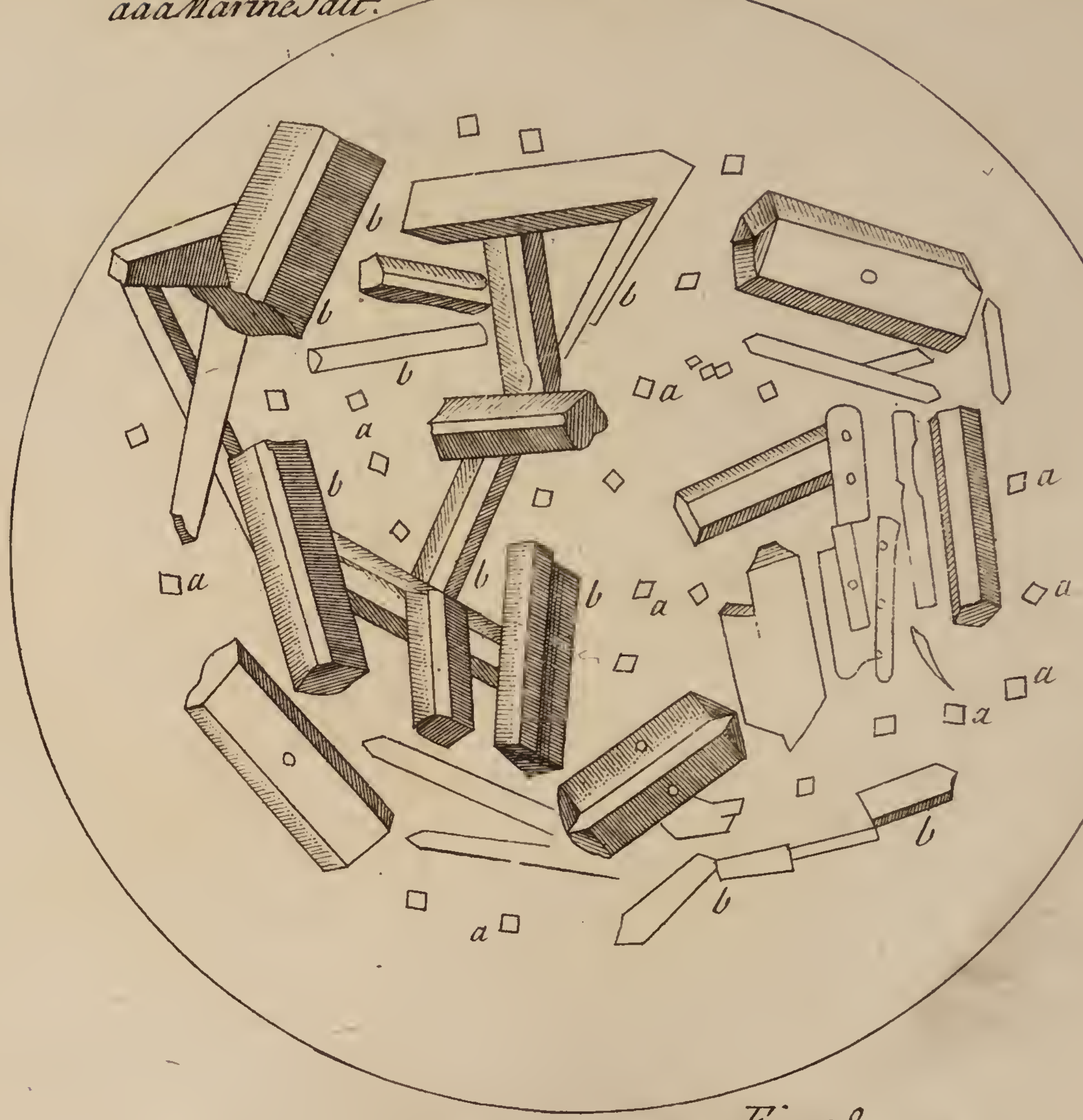


Fig. 25
The Salts of Pyrmont and
German-Span-Waters.

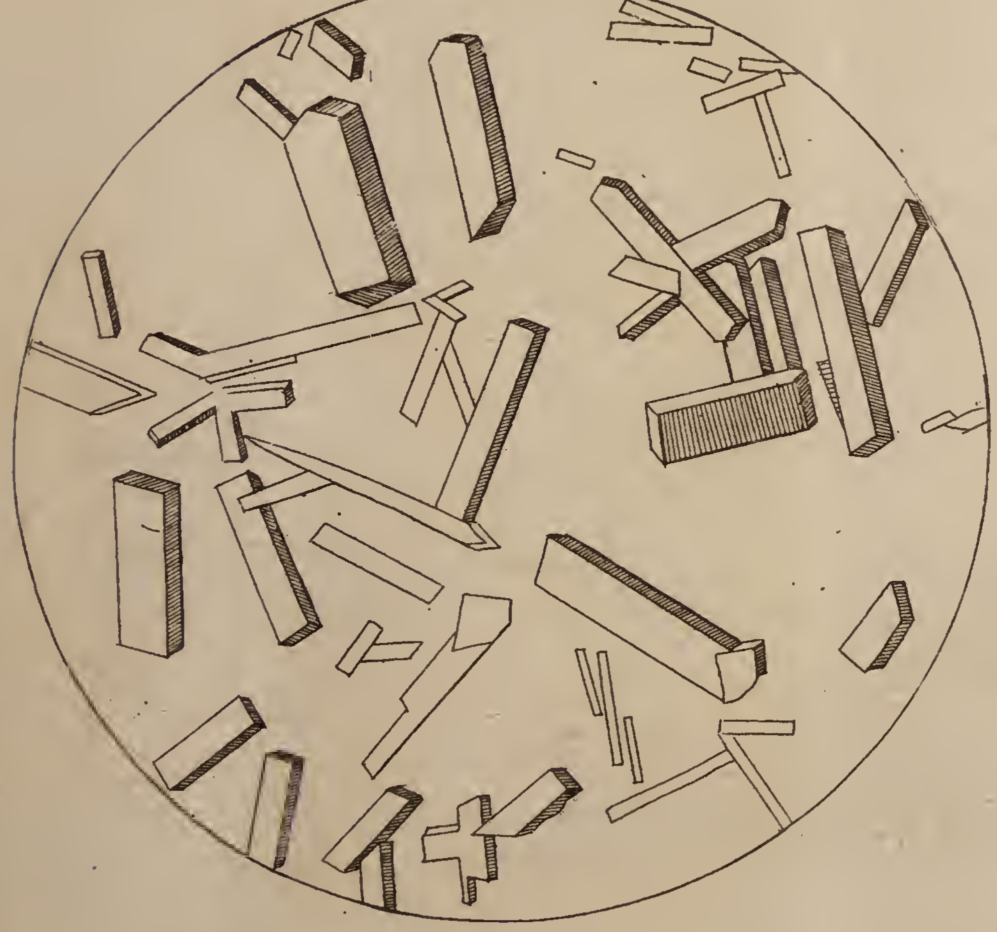


Fig. 26
The Salts of Tilshelf Water, the Black
Spots are Merine Salt b b b Nitre.

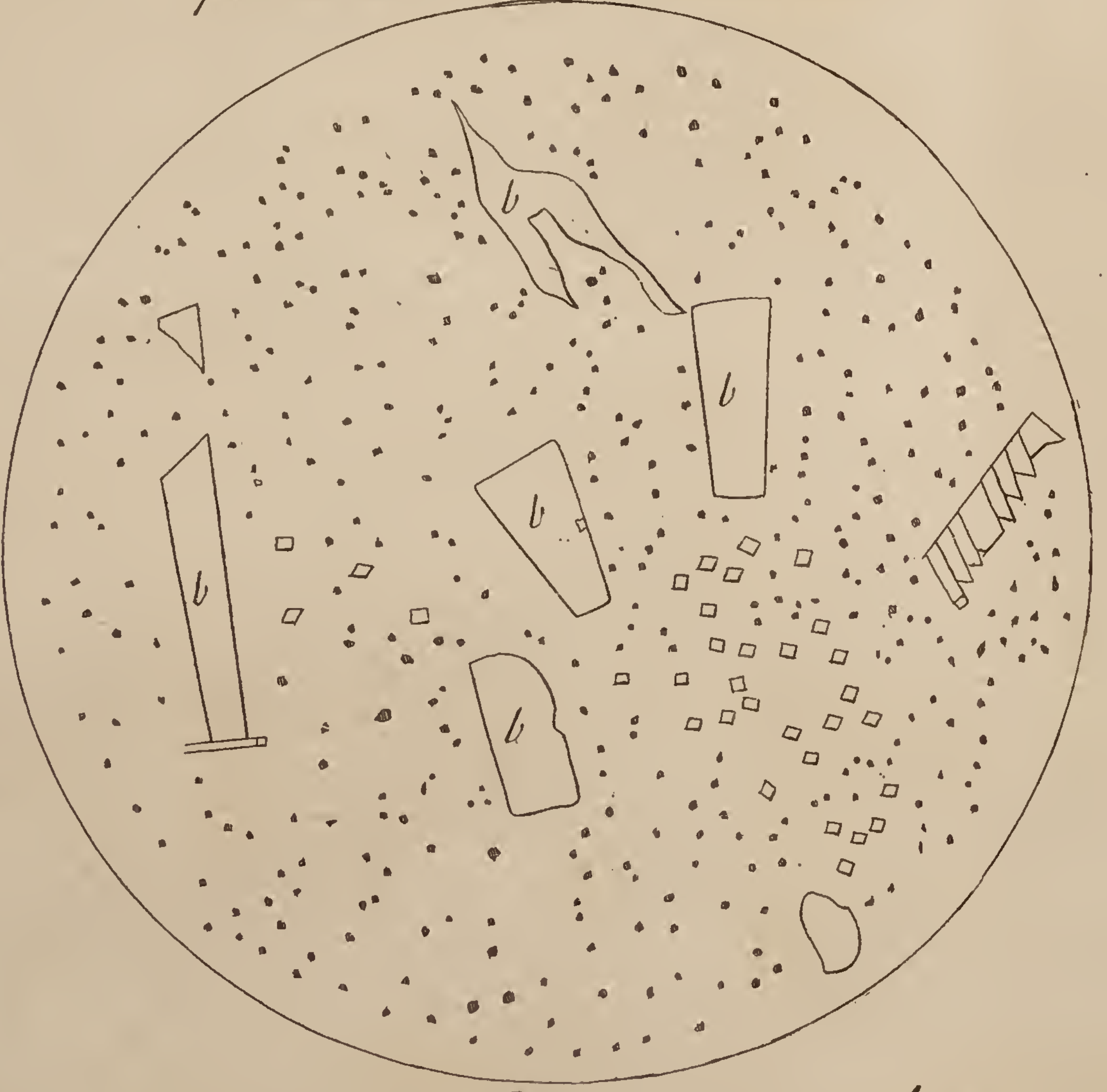


Fig. 27
The Salt of Bromles-Moor Span.

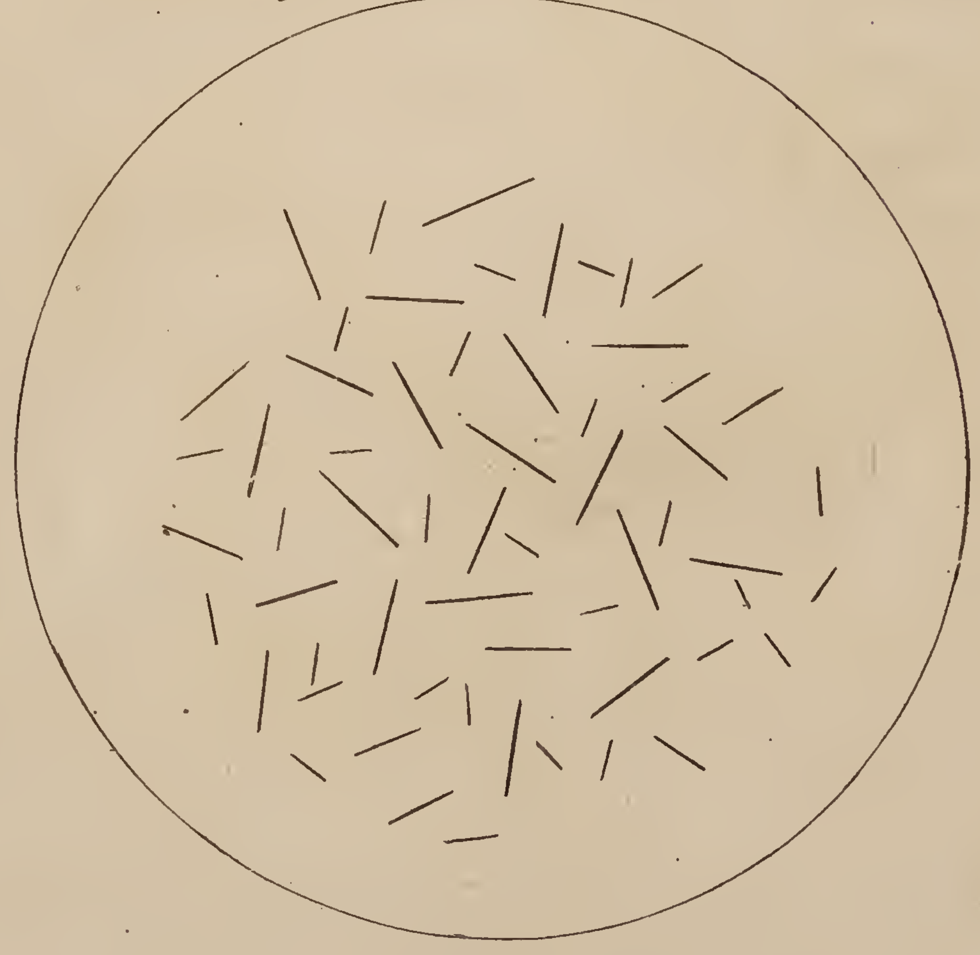
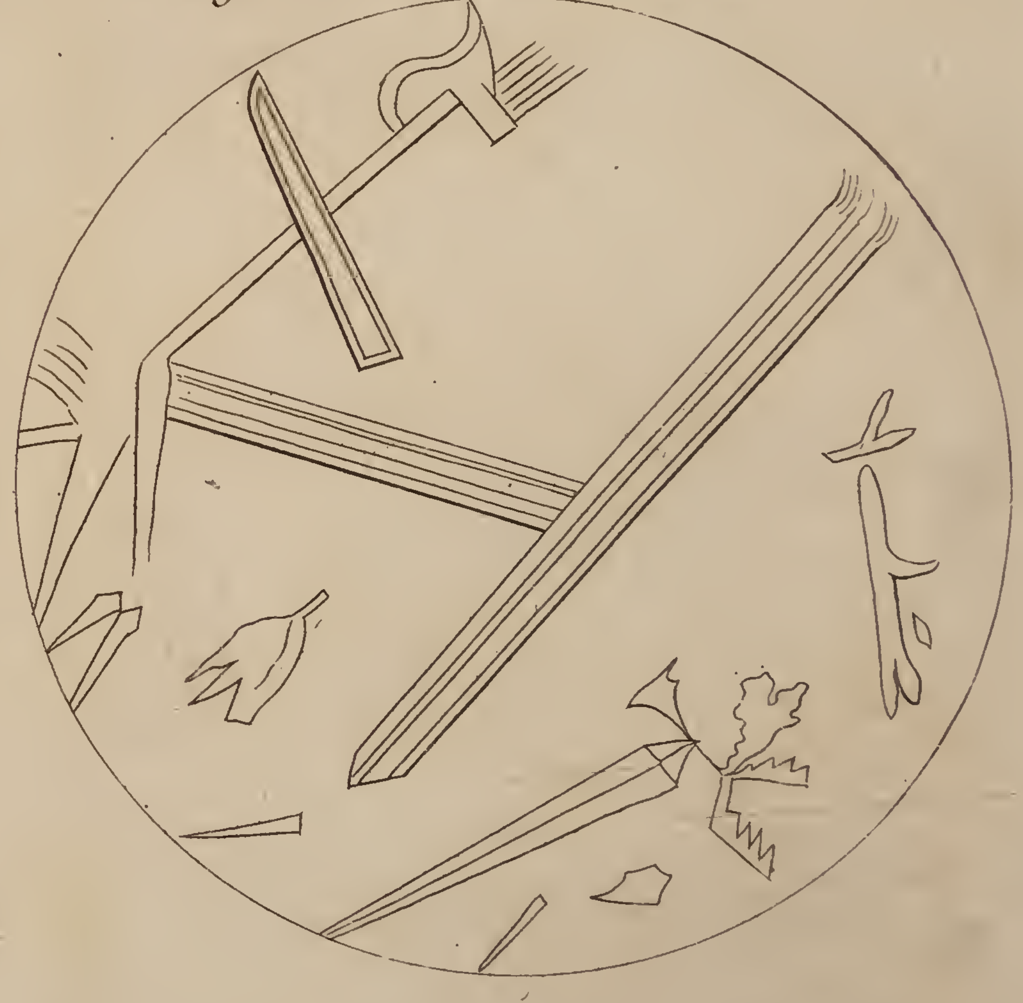


Fig. 28
Crystals of the Salt of a Water sent
Me from an unknown hand.



To the Right Honourable Tho^{s}: Lord Malton, &c. &c.
Thus Plate with the History of Malton Span, &c. is dedicated by his Lordships,
most Obliged & Obedient humble Serv^{t}: Tho^{s}: Short.

Fig. 1
Crystals of Marine
Salt alone.

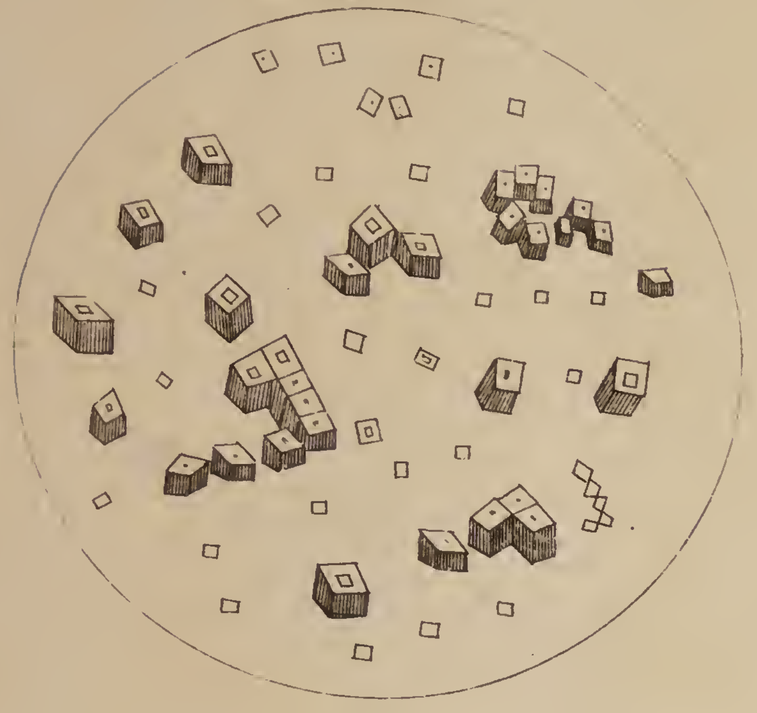


Fig 2
Crystals of Vitrial Extracted from the Alum
well (so call'd) above Buxton

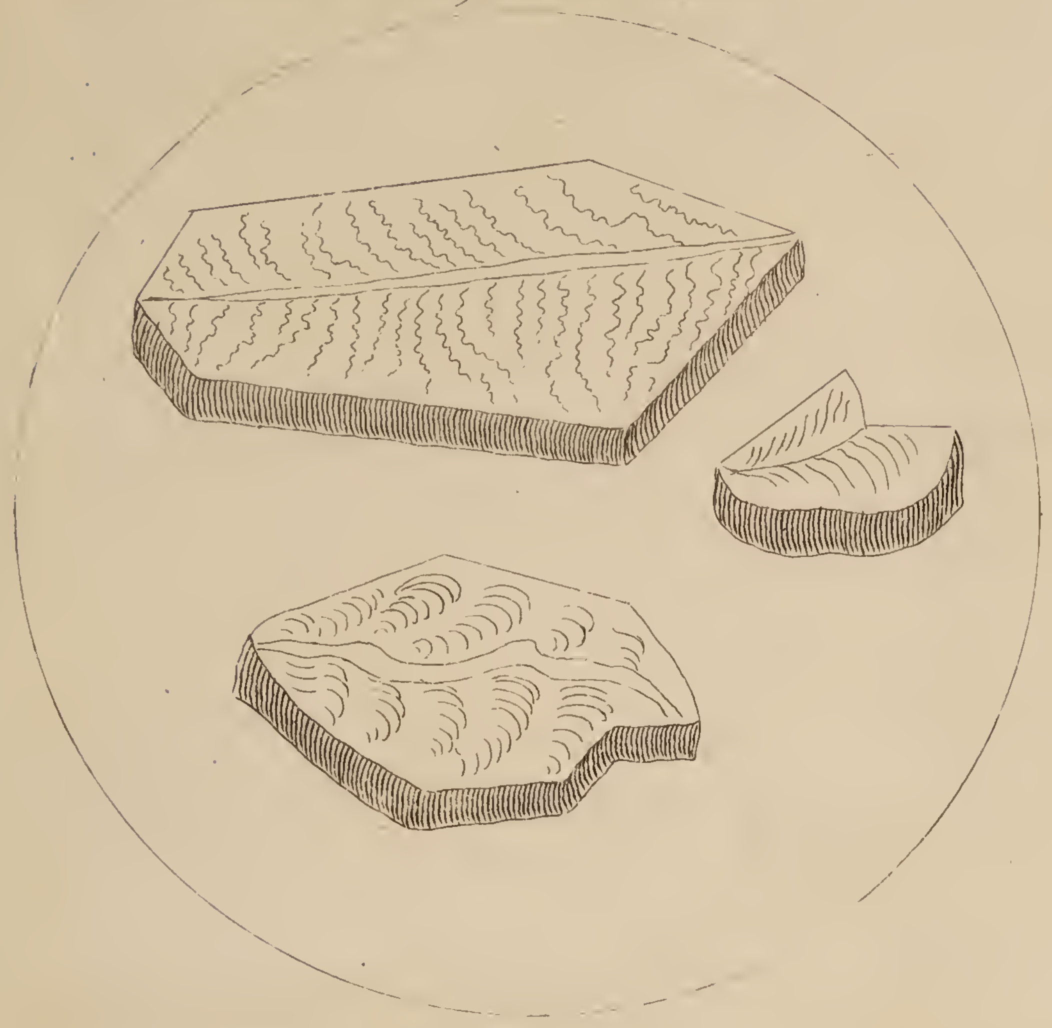


Fig. 3
Crystals of Alum from the
Salt of the Stone

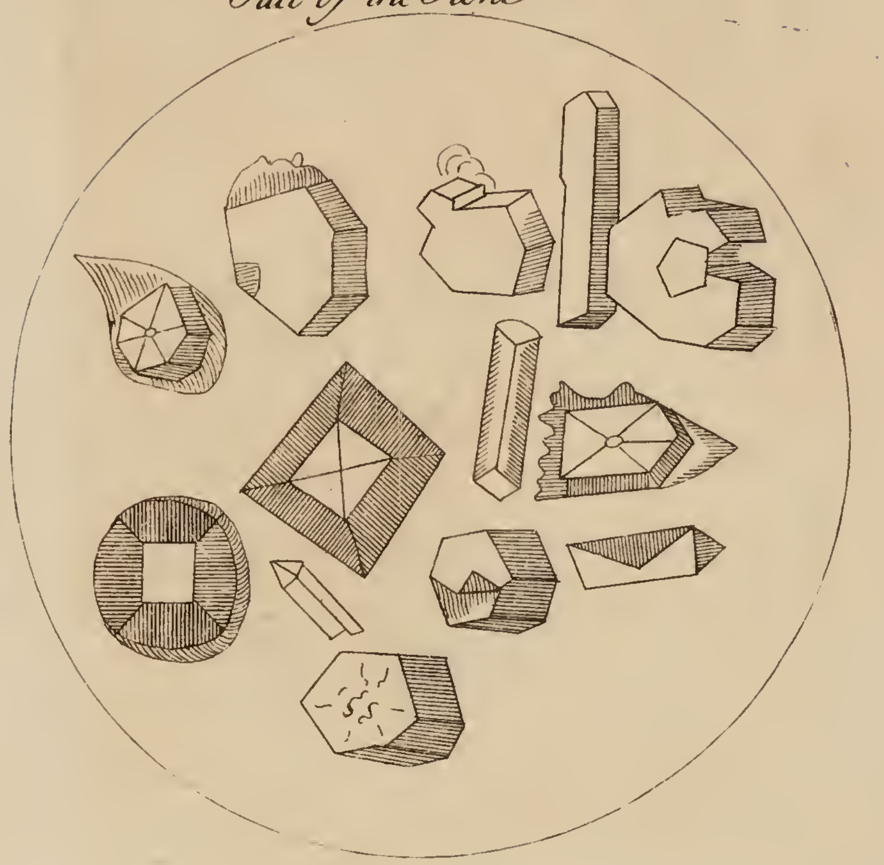


Fig: 4
Buxton Bath Salt wherein a a a &c represents y^e Crystals of
Nitre b b b & Marine Salt cc Clusters of Crystals of Marine Salt.

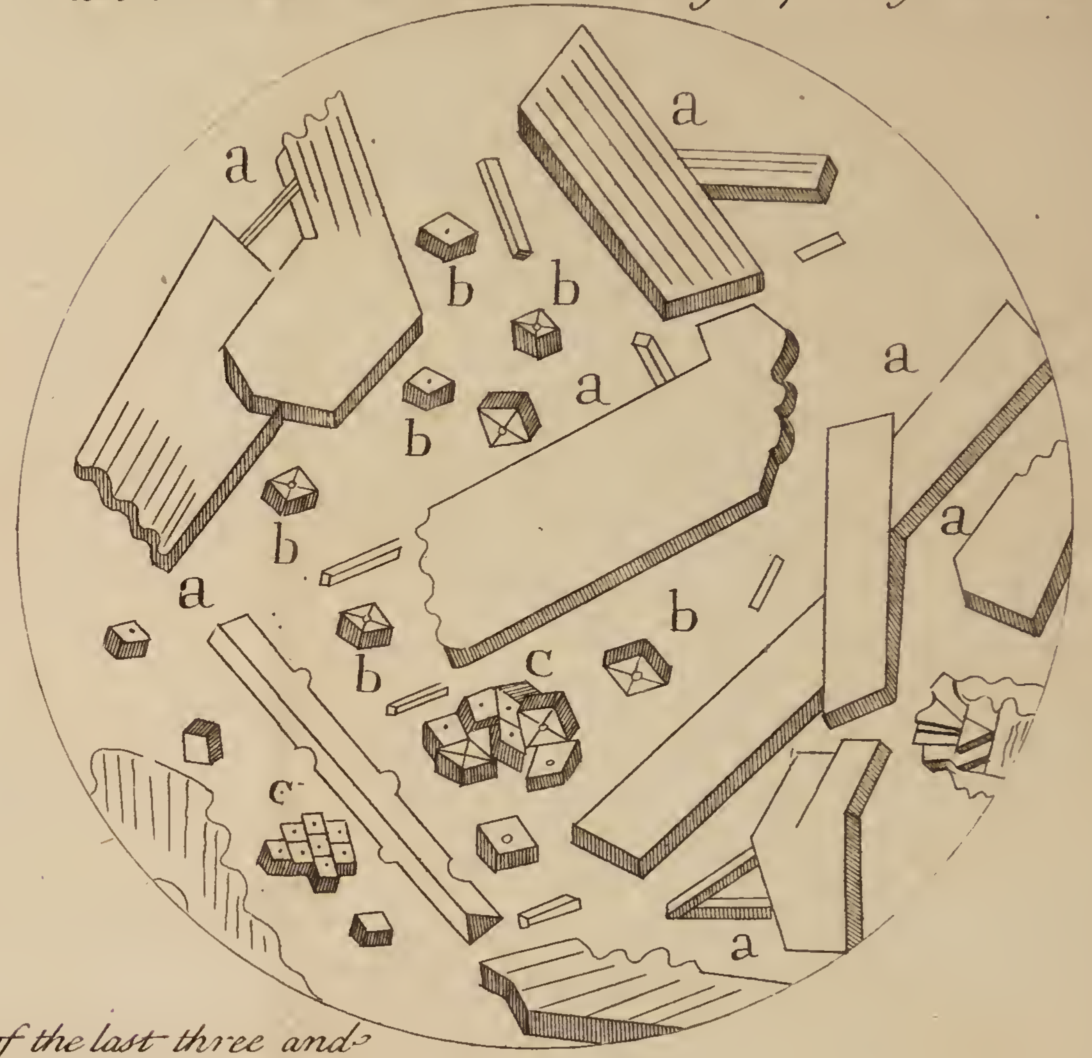


Fig. 5
The Crystals of Salt from S^t. Annes Well a a a Nitre
b b b Marine Salt c c c Clusters of the Salt.

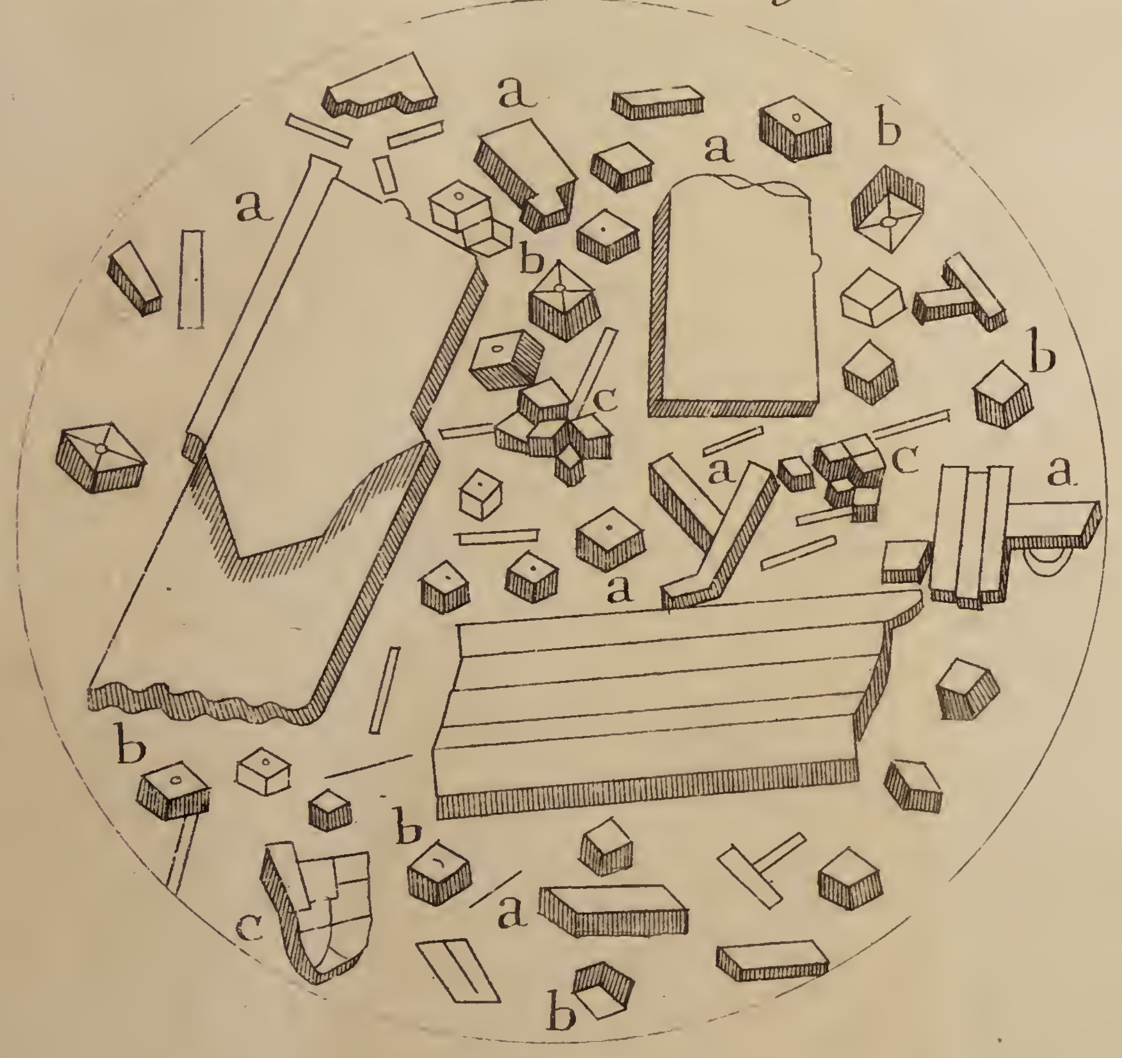


Fig. 6
M^r. Leighs or Bingham Well a Nitre
b Marine Salt.

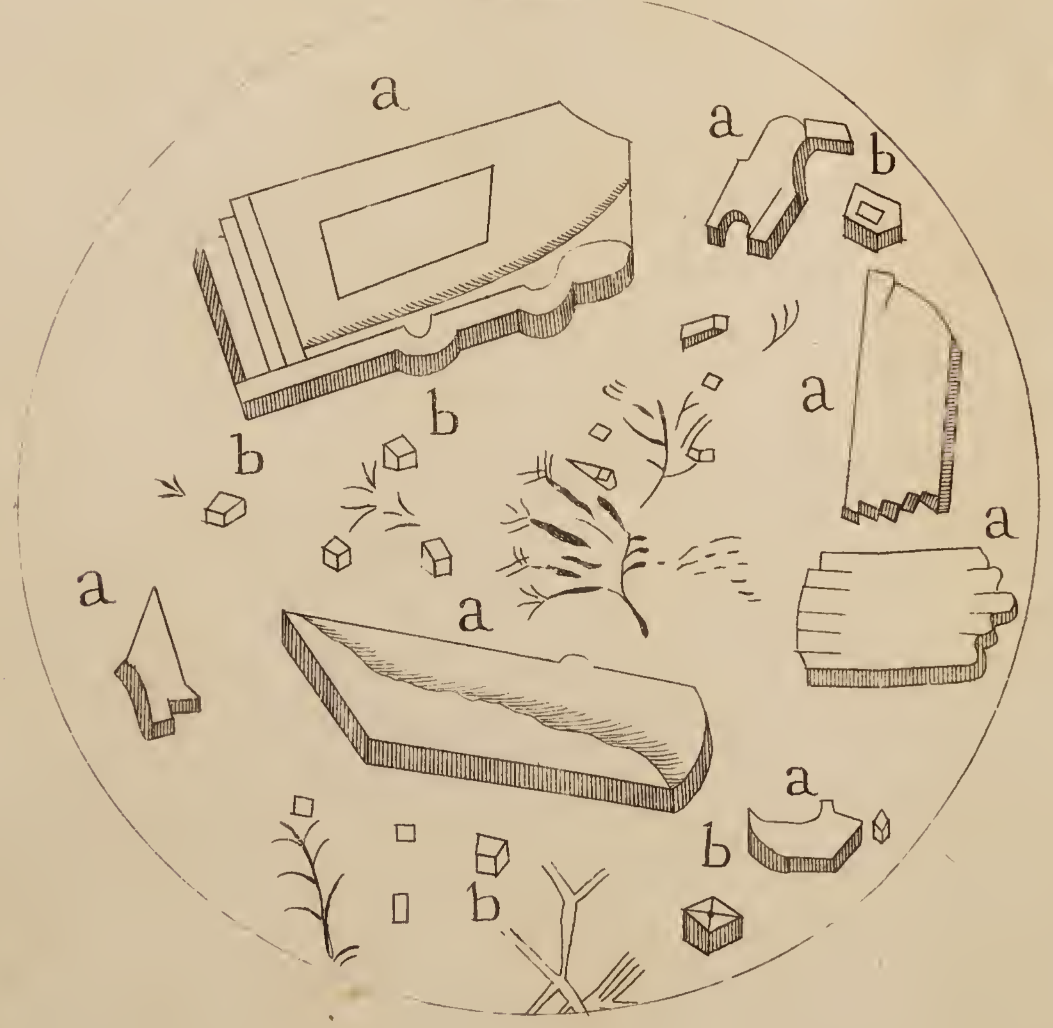


Fig. 7
The Nitre of the last three, taken out of the last three and
laid on a Sawcer by its ſelf a a a Nitre b one of the
Crystals broke transverse cccc represent y^e ends of those Crys-
tals x a Crystals of Nitre with several Crystals of Marine Salt
within it

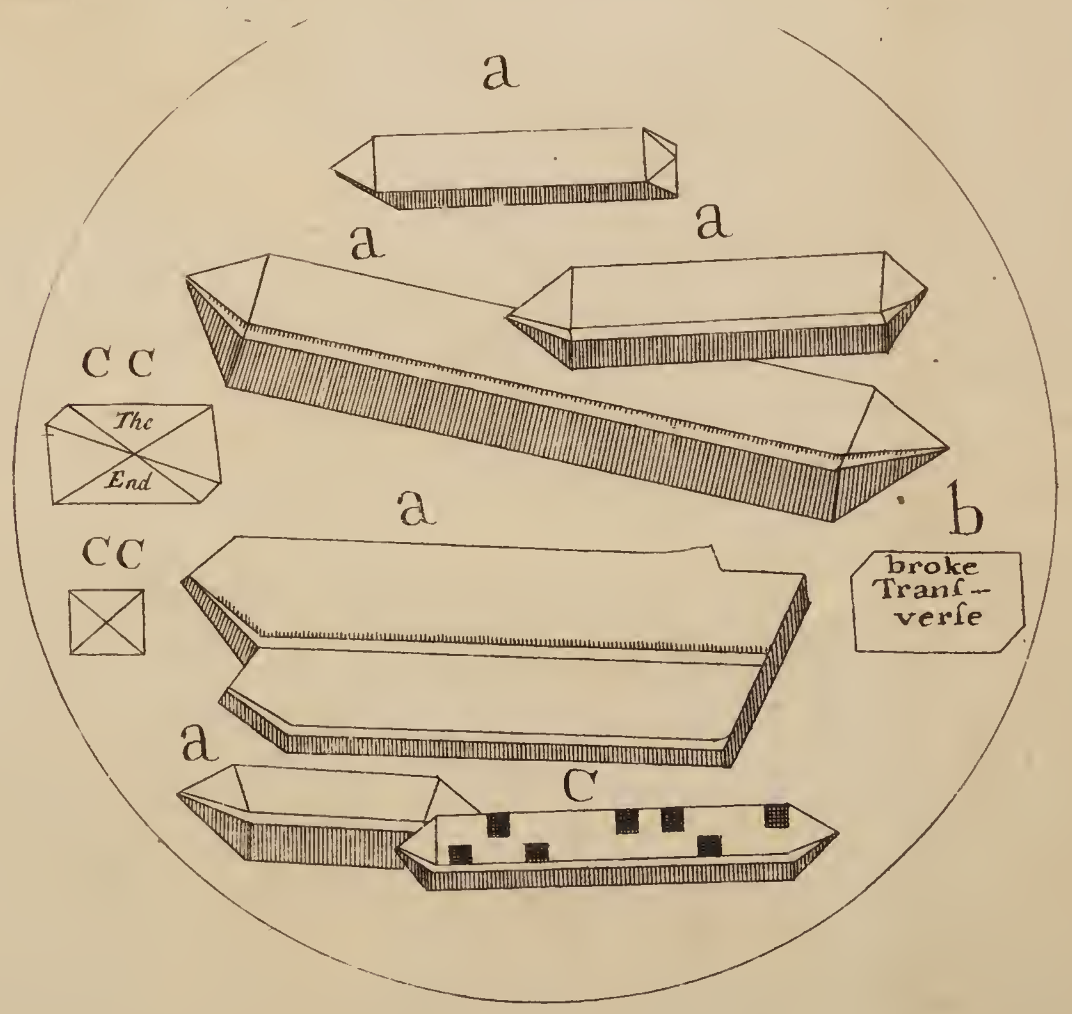
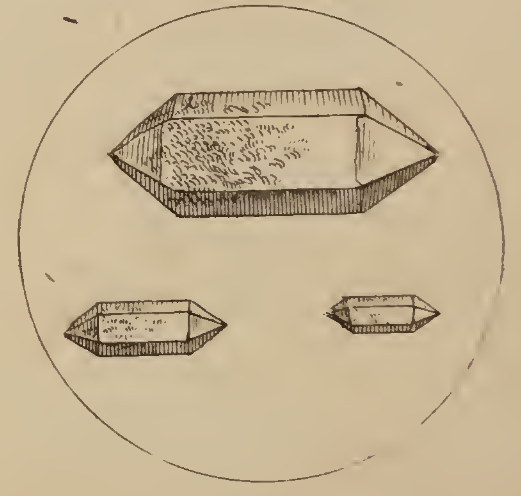


Fig. 8
Represents Buxton
Diamonds



To the most Noble and Illustrious Prince, William Duke of Devonshire
this Plate with the Discourse on Buxton-Waters is most humbly Dedicated by his Graces
most humble Servant
Tho: Short.